JUNE 25, 1942

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IRONAGE

An army marches on its stemach"

••• AND we are proud that Aristoloy and Coppeo steels — in tanks, guns, ships, munitions and all the other implements of war — are helping our armies march to Victory.

TO MAKE GOOD STEEL"

CARBON TOOL STEELS · ALLOY TOOL STEELS
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He Didn't Wait for a Compound to Produce This Job

Claude L. Nichols, turret lathe operator for WILCOX-RICH CO., Saginaw, avoided holding up an important job by a practical tooling setup to produce the piece which otherwise would have required a turret lathe with compound cross slide.

The photograph at the left shows how he used a taper cam on the cross slide and a roller in a turret station to guide the cutter for an accurate steep taper and smooth finish. The cutter is also ready for facing off and turning O.D.

Thousands of machinists in war work run up against new turning jobs and finishes that challenge their ingenuity. Hundreds of turret lathe operators, anxious to help others, send in their "Ideas for Victory" to be printed in "Blue Chips", a bulletin sent free by Warner & Swasey to thousands of turret lathe operators. These ideas aid old-timers as well as learners. Make sure your men are getting "Blue Chips" at their homes. Write Warner & Swasey, Cleveland, Ohio.

By locking the hex turret and

using a taper cam block to guide the cross slide, the square turret

produces an accurate bevel.

YOU CAN TURN IT BETTER, FASTER, FOR LESS ... WITH A WARNER & SWASEY

JUNE 25, 1942

VOL. 149, NO. 26



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Greater Security . . . FOR OPENINGS ON INSIDE WALLS AS WELL AS OUTSIDE DOORWAYS

THAT Mahon Rolling Steel Doors, for exterior openings, provide the greatest possible protection from fire and intrusion is well established in the minds of architects and building engineers responsible for completion of the present enormous industrial building program . . . and by the experience of thousands of plant owners where these doors are now in almost constant service, day and night.

It is equally important that this same protection be assured for the openings on inside walls (interior partitions, dividing fire walls, corridor walls, elevator shafts, etc.) Under present war production conditions, fire and

damage hazards are

Frequently, too, it is essential that certain departments be kept segregated, without interfering with the inter-department movement of materials and authorized employees.

The practical answer is either Mahon non-labeled Doors or Mahon Underwriters' labeled Doors, for automatic closing in the event of fire. Mahon engineers will gladly assist you in the planning of any construction project and furnish you estimates—promptly. The new Mahon Rolling Steel Door catalog-or Sweet's-describes in detail the many improvements and advantages of Mahon construction and



THE IRON AGE

JUNE 25, 1942

ESTABLISHED 1855



Partly About Women's Hats

A GENTLEMAN from the Middle West disagrees with my thesis that purchasing power marches on two feet. One is cost reduction, or making things available to more people through lower cost and price. The other is conservation, or making what you have last longer and give more service. I believe that both of these causes effect a broadening of purchasing power by making the consumer's dollar go farther.

My friend is perfectly willing to accept one foot but not the other. He swallows the cost reduction idea but rejects the conservation theory.

"You say," said he, "that we are now learning how to get 30 to 40 thousand miles from a set of tires, whereas we were formerly satisfied to get 15 or 20 thousand. That may be O.K. for the consumers, but doesn't it put the tire makers behind the eight ball?"

It put the tire makers behind the eight ball?"

I replied that both he and I were old enough to remember the time when one congratulated oneself if a set of tires held together for 3000 miles. And that the tire business evidently had not suffered during the years that it had progressively built more and more wearing power into its product.

Then he came back at me with a comment about yearly models in the automobile industry and how style obsolescence was responsible for building that industry's output to 5 million units a year. But the answer to that was that when you bought a 1942 model, your discarded 1941 did not go to the scrap pile but into the hands of a succession of owners in decreasing degrees of purchasing power, ending perhaps with Indian Joe of Oklahoma in 1949. Thus ownership and usage are two different things; one being current and the other accumulative.

Faced with this impasse, my friend used brutal tactics and referred to women's hats. "Stabilize styles in women's hats for six months and you would ruin the millinery business," said he. "Also, you would ruin the disposition of womankind."

Now that was a tough one and I could not answer it except to say that social objectives sometimes outweigh economic ones and that a little waste of our economic resources seemed permissible and preferable to the ruin of feminine dispositions.

With a few such obvious and necessary exceptions, I still maintain that getting the most and the best service out of the things that you have is a way to develop purchasing power with which to buy things that you have not and would like to have. And I do not believe that waste of any kind makes wealth.

We need more scrap iron and steel, for example, to help the war program. One way to get it would be to instruct contractors to take deeper cuts in finishing and to spoil more parts, thus feeding the scrap pile. But I do not think that anyone would advocate that way of trying to win a war.

Nor do I think that the same philosophy, applied to the stimulation of markets, will help us win the peace.

JA VanDuents

These Plants Are Anxious for War Work

They can start production at once on war contracts and subcontracts

Write, or wire, Inland for the names and addresses of any of the metal working plants listed below. They are representative of a longer list of Middle Western plants prepared by Inland for the purpose of speeding all-out war production.

We suggest that you get in touch with us even if the types of plants and equipment you need are not listed on this page, because in addition to the other plants on which we already have information, our list of available war-work plant capacity is continuing to grow.

Large Wis. sheet metal bldg. prod. mfr. desires war work. Emp. 25 one shift. Sheet metal 14 to 32 ga. Equip. includes 11' power sq. shear, 36" foot sq. shear, power gang slitters, sheet metal pipe forming machine 2" to 6", hand and machine power rolling machines, No. 3 and No. 5 punch presses, No. 10—10' power brake, No. 20 ga. cap. 30" throat nibbler, spot welder, 10,000 sq. ft. fl. sp. Remodel or replace machinery for special govt. work. Capital and best of credit rating available.

18-14 Large Mid-west spring bed mfr. in fireproof bldg. with over 40,000 sq. ft. fl. sp. located on railroad siding. Plant includes a full line of punch presses, coiling machines and various other equip. used in making bed springs. Have coilers for making special springs for aviation industry. Also two shapers, two lathes, milling machine, drill press, grinders, heat treating facilities and misc. mach. shop equip.

Wis. dairy equip. mfr. emp. 100, has approx. 80,000 sq. ft. fl. sp. available for fabricating and welding custom built equip., ample shipping facilities. Equip. includes 8' slip roller, lathes—polishing, turret, 24", engine—12", and bench; drill presses—hyd. horiz.; bending brakes, shears, drills, grinders, millers, shapers, welders, slashers, rip saws, jointers, sanders, and facilities for sand blasting and metallizing; hot dip tinning plant; spray booth painting equip., sheet metal and woodworking machines. Anxious for war work contracts.

IS-55 Well equipped Mid-western plant with over 300,000 sq. ft. of sp. emp. over 400 men. Desiring prime or sub-contracting work. Mfg. facilities include 4 planers, punch presses, forming, mach. shop, pressing, bending, forging, flame cutting, grinding, sheet metal, grey iron fdry., painting, riveting, brazing, gas, arc, spot welding, polishing, tool making, packing, shearing, machining, assembling, heat treating, wood working, bending, pattern making. Entire plant available for war work. Can mfg. parts or complete assemblies.

15-13 Ohio mfr. of decorated metal dry package cans, signs and displays. Two plants, fl. sp. 370,000 sq. ft.; emp. 250. Dry package assembly line from 1½" to 16" dia. Automatic and hand-fed punch presses, complete decorating and baking equip., with facilities for coating and baking sheet metal. Lithographing, engraving and screen processes.

IS-50 Largest mfr. of kitchen utensils in the Midwest with complete facilities for fabrication and porcelain enameling of metal shapes up to 12½" deep of 10 to 32 ga. metal (44" max. blank size) wants volume production of stampings or porcelain enameling. Welcome all inquiries of this nature. Buildings available for limited expansion. Factory has 15 acres fl. sp., 400 emp.; produces its own power and water, and has its own police and fire protection to insure uninterrupted operation. Press equip. ranges from numerous light punch presses to 375 t. draw presses. (Complete facilities records available to bona fide prime contractors.)

IS-54 Ind. metal prod. mfr., 90,000 sq. ft. fl. sp., completely equipped for forming lighter gages of sheet metal, 50,000 sq. ft. for assembly of other production work, emp. about 140. Company operates own fleet of trucks.

IS-15 Long established Mo. fabricator heavy sheet metal, light plate and structurals. Equip. includes 10 ft. and 12 ft. press brakes, gate shears, 10 ft. rolls (plain and corrugated), punch and drill presses, welding and gas cutting equipment, many years experience in Government work and currently occupied on sub-contract basis. Working one shift only.

18-11 Capacity of three large plants in the Middle West, 1,000 emp. For production of 10—24 ga. steel products including shearing, forming, stamping, drawing, welding, riveting, dip and spray painting and electro-galvanizing. Adequate capital and highest credit rating.

IS-52 Ind. water heater and boiler mfr., over 200 emp., has 143, 000 sq. ft. fl. sp. with approx. 160,000 available for expansion, shipping facilities—2 railroad sidings and truck loading. War work desired for tank dept., welding, galvanizing and mach. shop. Equip. includes Nos. 3 and 4 turret lathes (15"), No. 5 (17") multiple cut No. 6; No. 1, 2, 3, and 4 drill presses (singles to 6 spindles); punch presses, die space 5½ to 7½", 15 to 60 t.; horn press, gear punch press, die space 10½", 75 t.; spud press, welding machines—circular, spot, seam, hand and semi-automatic; 10' shear ¼" steel; roller 6'; gal. to 36" x 72", pipe threading—¼" to 4" incl., Hyd. testing machines, paint drying ovens—40'; boring machine 4 spindle, degreasing machine, press brake—6 and 8'; and nibbler.

IS-16 Thirty-year-old nationally known Mo. machinery mfr. emp. 250 including approx. 36 men on eng. staff, has 75,000 sq. ft. of fl. sp. for seven day week operation. Equipped to form standard and special shapes from sheet steel, channels, angles and Z-bars. Complete mach. and welding shop.

1S-53 Wis. mfr. specializing in light and medium stampings has 100,000 sq. ft. fireproof mfg. sp. on railroad side track, emp. about 200, has punch press equip. from 10 to 185 t., 6" to 8" stroke; draw work 2" to 4" deep; spot welding; assembling; enameling; and plating; special auto. equip. for mfg. rolled bushings; engine lathes and shapers. Forty-three yrs. experience.

IS-12 Large Ill. concern, 36 yrs. mfg. machinery, 20,000 sq. ft. of mfg. space with approx. 100,000 sq. ft. for storage. Slab milling machine, gear shaper for internal and external spur cutting, engine and spindle lathes, vertical boring mill, gear hobber, milling machine, sensitive, radial and vertical power drills, tapping machine, planers, cutting saws and electric welding machines. Have 38 men on three shifts, also training classes. Interested principally in war work sub-contracts for medium size parts.



Murray Corp. of America Perfects..

UNIQUE \ AIRCRAFT CONSTRUCTION METHODS

By W. F. SHERMAN

Detroit Editor, THE IRON AGE

ARIATIONS in methods of handling, heat treating, shaping, forming, assembling, riveting, welding and painting of aircraft sheet metal parts have been introduced in the aircraft division of the Murray Corp. of America. Where these practices differ from the more-or-less standard practices of the aircraft industry, they are attributable to the intention of accelerating wartime aircraft production and are explainable, in part at least, by the coincidence of volume production requirements (larger than those within the peacetime experience of the aircraft industry) and a combination of a large available supply of press shop equipment, specialized engineering, and extensive experience in tool and die making.

The Murray aircraft production program represents one of the earliest efforts of the automotive industry to assist in production of war planes. It has its beginnings in the early fall of 1940, with an announcement by an aircraft company in late October, 1940, that Murray would assist in a program of manufacturing bomber wing sections. This was followed in the late winter months of 1941 by the

... A former manufacturer of automobile bodies swung into mass bomber wing production over six months ago. Assembly operations are broken down, double-action dies on mechanical presses are used for deep forming, and a number of tricky production innovations have been adopted—as, for instance, refrigeration of 24SO sheets, a flowing machine for strip and extrusions, special rivet "backers", etc.

signing of contracts and the beginning of a large-scale tooling program.

This former manufacturer of automobile bodies has followed two typical automotive manufacturing techniques, first, in the use of double-action dies on mechanical presses for deep forming and, secondly, in breaking down of assembly operations to a degree that permits a great many assembly workers on each sub-assembly through the movement of the sub-assemblies from station to station and from one assembly jig to the next along the line.

The principal material employed in Murray operations is Alclad, aluminum alloy sheet, although a considerable production of stainless steel parts is also carried on.

The aluminum alloys, most frequently of the 24S variety, are received both in the annealed and the

heat treated condition, depending upon the subsequent processing and the types of parts that are to be made. In any event, the annealed material must be heat treated so that all of the products consist of heat treated duralumin, or material in the ST condition.

Heat treated material is painted as soon as received at the plant and parts fabricated from this stock are immediately sent to assembly operations or to the bank of parts awaiting assembly. Parts formed from this material are parts requiring no deep drawing and relatively little change from the flat sheet condition.

Principal departure from conventional processing is that involving the handling of 24SO, annealed aluminum alloy. Here the practice is one that is comparable to the long-time aircraft practice in the handling of rivets. It has been the



FLAT sheets are heat treated and plunged into this quenching tank before forming into aircraft parts. This rack carrier plunges into cold water and is raised from the water by an overhead hoist.

box for storing. In this end-opening container, dry ice is placed on the shelf above the parts to keep them cold. Top-opening containers are used in other instances.

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practice to heat treat rivets and then take advantage of the time lapse before the rivets age-harden.

This is done either by installing and setting the rivets within a short time after the heat treat, or by refrigerating them and making use of the fact that heat treated aluminum can be kept soft for a considerable period of time at low temperatures.

This, briefly, is the cycle now adopted for use with sheet stock. It is the practice here to cut the annealed sheets to size and shape required, either by square shearing or by blanking and, very occasionally, by routing. The router is used only when blank sizes are too great to be accommodated in the blanking press. Incidentally, some of the blanking is accomplished with sheet steel on masonite dies,

using the familiar Guerin process.

After the sheets are cut to size, they are heat treated in a Lindberg electric oven, quantities of blanks being put through the oven together in a rack on a wheeled carrier. Immediately after heat treating, the aluminum is quenched in cold water, is rolled level and then put in a refrigerated box and kept in this container until ready for use.

The primary advantage of this process cycle is that the parts, after forming, are not subject to the distortion that comes with heat treating. Instead the parts age-harden without warpage or wrinkling and maintain shape. But a secondary advantage, not looked for when the processing was originally worked out, is that breakage, tearing and cracking during the stamping op-

eration have been substantially decreased because the metal seems to accommodate itself to the shape of the die more readily when it is in the interim period between heat treat and final age-hardened condition.

Actually, this latter advantage has been considerable since scrap loss is only about 0.5 per cent, compared with a considerably higher loss when the soft (SO) sheets are put into the press.

It is also probable that the quenching is more uniform and complete when the flat sheets are quickly dipped in cold water than when odd shaped pieces are so dipped. The handling of the flat sheets in the heat treating oven is also simpler than when odd shaped parts are put through the oven,

since it is possible to rack the sheets more easily.

The heat treating is accomplished at a temperature of 920 deg. F., with a time control exercised over each lot. An actual tabulation of the timing is as follows:

Thickness	Annealed 24SO
0.020 in. map.	20 min.
0.020-0.032	25 min.
0.032-0.063	30 min.
0.063-0.125	40 min.
0.125-0.250	50 min.
0.250-0.500	80 min.

Sheets and parts are normally loaded with air and water circulation space around them.

The stamped parts that are so heat treated are those that are formed principally in the Guerin process, and are subject to very little forming, perhaps only flanging.

When the heat treated material is cooled in the quenching tank, the carrying car is lifted out with an electric trolley hoist, and the sheets are unloaded. Because the heat treating has made the sheets

Fifth of a series of articles on Improved Aircraft Fabricating Technique. Four previous articles described developments at Lockheed Aircraft Corp., and were entitled "Stretch-Forming Contoured Sheet Metal Aircraft Parts", "Drawing Dies for Airframe Stampings", "Forming Convex Flanges and Joggles", and "Hydro-Press Forming with Rubber Platens."

so the total of the sandwich is not more than $\frac{5}{8}$ in. Such leveling brings the sheet back to a normal flat condition.

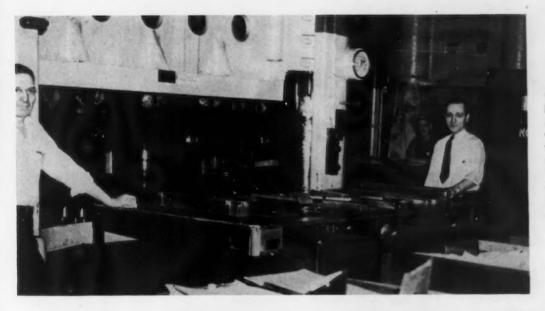
The refrigerator containers are portable dry ice boxes with double walls and granulated cork insulation. They vary in size, depending upon the blanks they are to contain, but are approximately 8x4x4 ft. high in most instances. It has been found that if the door is not opened at all in this ice box the sheets can be kept for 48 hr., but it is considered more practical to use the sheets as soon as possible after heat treating, preferably within 24 hr. Actually, several

hours is the usual time. The temperature ranges from below zero to just below freezing point.

This processing eliminates the requirement for hand working or re-striking of parts since there is no distortion after the parts ageharden.

Shaping and Forming

The general practice in cutting blanks for the press room is to use the square sheer whenever possible, because this method is the simplest and least expensive of the available processes. Blanking dies are too costly for general use, considering



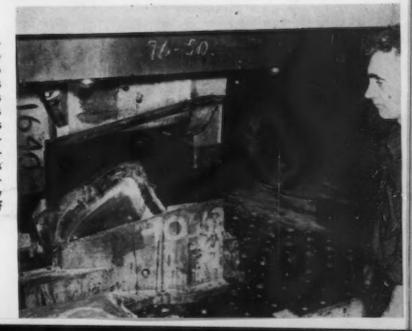
AUXILIARY fiber dies are placed over some parts for re-strike to give sharp definition in the Guerin press process sometimes. At the extreme left and extreme right such dies are shown ready for use.

wavy, the roller leveling is required.

The roller leveling equipment is similar to that used on steel blanks for auto body parts but has been altered so the sheet does not get kicked up sharply as it enters the roll. Instead, a slight initial hump or wave is given to the sheet and then it is run through the normal leveling rolls. It has been found possible to run through a stack of aluminum sheets at one time. The surfaces are protected from scratching by sandwiching the sheets between two sheets of carbon steel approximately 0.040 in. thick,

DOUBLE-AC-TION Kirksite dies replace drop hammer operations on aircraft parts 100 per cent. This photograph shows the punch partly extended from the upper die and shows clearly the formation of the draw ring and edge of

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KIRKSITE dies are cast approximately to shape and are finished by filing and hand grinding. A grinding booth, complete with dust removal equipment is installed in the Murray die shop. This technique eliminated requirements for Keller operations.

the number of parts being formed.

The Guerin process is used quite extensively, also, since it is another relatively inexpensive method. (It is described in the series of articles "Job-Lot Stampings of Aircraft Parts" in THE IRON AGE, Oct. 19 and Oct. 26, 1939.) Whenever parts are too big to be accommodated on the other equipment, the sheets are routed to size in the conventional manner after stack drilling.

Flat parts requiring flanging or having relatively little departure from a plane surface are formed by the Guerin process, because this type of die is inexpensive and does a very satisfactory job, even though parts so formed have a wavy appearance and sometimes require re-strike or some hand work to finish them. The Guerin process does not result in sharp corners to flanges or ribs in some instances, but it has been possible to obtain satisfactory results, particularly by re-striking and the use of an auxiliary fiber die.

An example of this auxiliary die practice is in the forming of a part made of 24SO material about



FLAT stock and extrusions "flow" into shape on this Metal Forming Machine.

A hydraulic ram squeezes the material (aluminum, magnesium and stainless steel) against the die on the rotating head on the platform at the left to shape aircraft parts.

24 in. long, slightly curved, and with a deep and relatively sharp rib formed along the center.

Clear definition is not obtained with the rubber blanket and single die. Therefore, the part is struck over again in the press, with a fiber upper die placed over the rib, under the rubber blanket. This forms the rib sharp and clear, stiff and straight. This modification of the Guerin technique produces a very satisfactory part.

All parts normally made in the past by the aircraft industry by the drop-hammer method are now made by Murray on double-acting presses with double-acting dies.

Murray has virtually standardized on a Kirksite cast zinc alloy. The Kirksite is cast approximately to final size and is finished by hand grinding and filing. It is the same as the material used by the aircraft industry for most drop hammer dies. The life of the Kirksite dies is entirely adequate for the number of airplane parts being built and the material later can be remelted and shaped into other dies in a simple foundry.

It is considered important that this material does not require the use of Keller equipment, which is very scarce in the Detroit area and would have been tied up seriously if a great many aircraft dies had

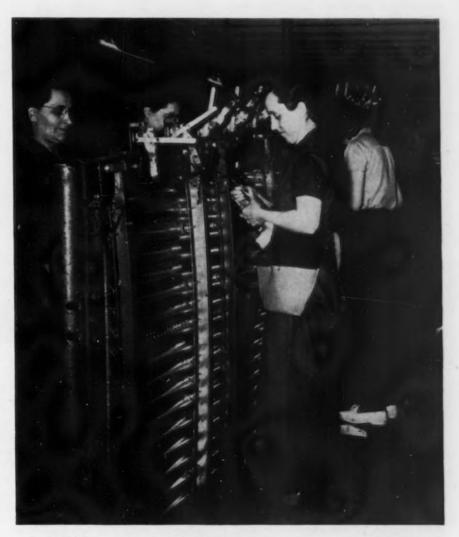
to be machined.

These double-action dies are unique in design. They make use of a draw ring, but never any draw bead. This permits considerable slippage of the sheets, so the material is not thinned out appreciably below the specified gage. The draw rings are designed in accordance with a practice developed for the fabrication of automotive parts, especially fenders. The draw ring follows the contour of the deepest parts of the die-as nearly as possible—and thereby greatly reduces the amount of actual draw that is required. Actually the sheet is permitted to bend or adapt itself to the shape of the deepest part of the die before the punch actually begins to draw the metal into shape.

A typical example is shown here in an illustration of the forming of half of the tail cone for the nacelle of the Douglas wing. Here the die, including the female die half, the punch and the draw rings, are made of Kirksite. This is a typical die and a typical part.

This type of die is cast in a sand mold made from the aircraft company's original plaster of the part. (Here lies another reason for vsing Kirksite: the models and plasters made by the aircraft companies are made to a "shrink rule" and the Kirksite corresponds to this "shrink rule". Otherwise, the automotive plants would have been required to make an entire new set of models.) In this instance, since a draw ring was to be incorporated in the die, it was necessary to make a pattern for the ring, so a sand mold for casting the ring could be made.

Press room practice is distinctly different from that encountered in other instances in aircraft parts making. The slow working of the part, as with the drop hammer, is eliminated. Contrary to the practice of some users of mechanical presses, the press is not slowed down or "inched" down, but is operated at its normal speed. The die design and draw ring design per-



A SSEMBLY of corrugated panels to form inner skin for Boeing wing.

Panels trimmed and drilled in previous operations are assembled, reamed and riveted here.

After the various units of the die are cast, necessary metal removal is done in the die shop and the dies are spotted-in on tables and benches. Then they are hoisted by crane and carried into a grinding booth where a spray of water carries away—for eventual recovery—the material ground off the die. Relatively rough grinding wheels and hand files are used. Automotive tool and die men have had little difficulty in accommodating themselves to the work.

mit this. However, output is somewhat less than when working with steel parts because of the care required in handling the sheet and the finished stamping.

Typical of the press room operations is the stamping of the nacelle tail cone described above. These operations are performed on a Bliss crank press of the 500-ton double-acting variety. Heat treated aluminum blanks are brought to the press in one of the ice box containers and the operator removes a

small stack of the blanks and places them beside the press. Before placing a blank in the press, the operator rubs the surface with a tallow lubricant. He places the sheets in the lower half of the die, being careful not to scratch the surface, since "scratched aluminum is scrapped aluminum". A helper daubs the sheets with soapy water to assist in washing dirt off the punch as an additional precaution to avoid scratching the sheets. The press

sults attained by the cycle of heat treating, forming on double-acting dies and age-hardening the parts, is the fact that hand work required is virtually zero. In fact, the rework department for this plant consists of only four small bays on one floor, despite the fact that the concern is in substantial production on aircraft parts. The great reduction in the amount of hand work required is attributed principally to the heat treating setup and the

principal difference being the fact that, instead of "forcing" the metal into a desired shape it "flows" the metal into shape. This is accomplished by the use of dies and high pressure applied to the dies as the metal passes between them.

This equipment consists basic-

This equipment consists basically of an air-operated ram mounted on a base adjoining a steel platform which has on its surface a cam-like head. The ram operates horizontally against the cam surface of the movable head, and against dies which are fastened to this surface. On the end of the ram is a pusher block which is used to form the material to the die contour.

In operation, a strip of material is clamped to the die on the rotating head, the pusher block engages the surface of the material and slides over it, forming it to the die as the head rotates. Depending upon the nature of the piece being shaped, two or more successive operations, with different shaped shoes, are required to provide the necessary shape and contour.

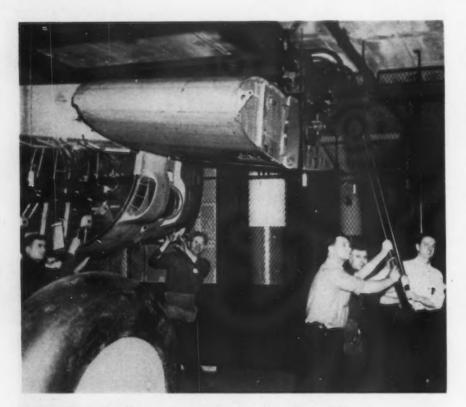
Assembly Operations

Assembly operations follow the basic idea of breaking down each job into a number of minor jobs, making use of a large number of jigs and carrying the work from station to station either by hand or mechanical means.

The technique of preparing and assembling the corrugated inner skin used on the bomber wing is especially interesting. Sections of corrugated sheets, approximately the correct size in each instance, are placed in special jigs for scribing, cutting and drilling. The jigs consist of a wood base with surface contours to fit the corrugations and a welded steel bar frame hinged along one edge, to be clamped down over the corrugated sheets. This steel framework forms an outer margin for scribing the sheet so it can be cut to size and also serves as a drill jig for drilling all the necessary holes.

Drilling is done through this jig without bushings, each drill being equipped with a pressure foot that fits into a hole in the jig and then permits the drill point to enter the aluminum sheet.

A novel method of indicating the size drill to be used for the many holes in the corrugated skin is employed by Murray. The areas of the drill jig around the holes are painted in various colors to correspond with a drill size chart in color



WING assemblies are transferred laterally by hand from one assembly line to the final conveyor. This transfer station occurs after the principal parts of the assembly are painted and prior to landing gear installation.

then forms the part in a single stroke and the stamping is removed from the die and stacked with the others in a box alongside the press. Sheets of tissue-like paper are placed between the stampings.

Press output in an instance like this varies upward from 50 per cent of the output normally obtained in stamping steel parts.

The press room equipment at Murray includes a variety of sizes of presses ranging upward to the 500-ton double-acting Bliss press, an 800-ton Hamilton press and an Erie hydraulic (use for rubber die work) with 2500 tons pressure.

This concern has made more extensive use of its press shop equipment on aircraft parts than any other to date.

Illustrative of the successful re-

use of mechanical double-action

On all operations, including assembly and those in the press shop just described, time requirements have been coming down steadily as the thousands of new workers in the plant became accustomed to their new tasks and the new materials.

A special piece of forming equipment, used in the forming of stainless steel parts, dural extrusions, aluminum alloy strip (also usable on magnesium) is the Metal Forming Machine made by Southern Engineering Corp., of Los Angeles, which heretofore has not made its appearance in the Detroit area. This machine differs from conventional bending and forming machines in many respects, the



The wings being built in this plant vary greatly in their designs. The former has a spar made of extended flanged sections milled to shape on a Farnham miller and riveted to a shear web. The latter wing has a main spar made of large size drawn steel tubing, approximately rectangular in shape, which is assembled by riveting. The wing has stamped aluminum ribs or bulkheads and a number of stringers to which the skin is attached by riveting. The wing has ribs formed of aluminum U-shaped channels-forming the contour of the wing section—and a truss built up of round aluminum tubing riveted into the U-channel. Covering of the wing consists of the double thickness skin, the corrugated skin on the inside and the smooth skin on the outside, attached mainly by riveting. The wings for light bombers are almost entirely flush riveted, while the heavy bomber wings have conventional rivet heads.

These differences in design have led to difference in assembly methods, most of which have been discussed elsewhere. It is of interest.

designed and copyrighted by the company. The color chart makes use of a half dozen colors with various arrangements and combinations to indicate just what size drill each one stands for. As an example. a plain blue paint on the drill jig corresponds with a plain blue rectangle shown on the color chart, indicating a No. 50 drill. For variation from the No. 50 drill there may be a gray circle painted around the hole or a gray border painted around the rectangle. Each of these markings would indicate some other size drill, corresponding to similar diagrams on the chart. This chart takes care of all drill sizes from No. 51 to 0.4375. There are 100 drill size variations provided.

Assembly of these corrugated sections to form the inner skin of the wing is done in a vertical assembly jig large enough to accommodate the entire skin panel for a wing.

The outer wing skin (smooth) is spot welded to form a single large sheet and the two skins (inner and outer) are assembled in a similar jig at a later stage. ABOVE

HYDRAULIC tests for all tubing and pipe lines. Electrical power outlet for this portable electric compressor is carried on an overhead trolley parallel with assembly line overhead.

RIGHT

ROTATING assembly jigs facilitate work on parts. This one is for assembly of side panel stringers and skin for a nacelle. The entire fixture is built around a tubular shaft mounted in triangular end supports.

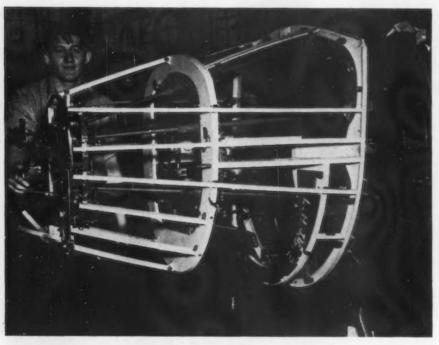


however, that the final asembly jig for the heavy bomber wing—consisting of 20 sets of left and right jigs—are all completed far in advance of production demands. The tooling on these wings is ample to supply delivery schedules that are already projected into next fall, when the peak demand will be reached.

These assembly jigs were the first in Detroit to require two-level

point at which the wing assembly is shifted laterally from one line to another.

Following a practice in general use in this plant, the final riveting of skins and minor parts is done on trucks or bucks in an aisleway. This is done to keep the assembly jigs in service on other wing sections, rather than tie up any jig until all detail work on the first wing is finished.



A NOTHER rotating fixture. This one extending horizontally from a support and base plate. It is used for the assembly of the tepee-like tail cone for a nacelle.

work platforms. Each level is lighted by fluorescent tube lights to give high intensity lighting and evenness of light distribution.

The bomber nacelles make extensive use of curved bands of strip aluminum alloy and curved aluminum alloy extrusions, both of which are formed on the Metal Forming Machine previously described.

For the assembly of four different nacelles (left and right inboard nacelles, and left and right outboard nacelles) four different sets of assembly jigs are required, and 32 jigs in all are in use in this department.

The wing sections are assembled in jigs similar to many discussed at other times in print. The one spectacular innovation in the completion of these wing panels is the overhead conveyor system which stretches from one end of the plant to another, including a transfer

A special routing machine has been developed to trim the tail cones of the engine nacelles. The trimming is required because the small areas of metal covering riveted together to form the skin of the nacelle do not present a clean, straight edge along the line where the nacelle and tail cone join together. This, of course, occurs because of the difficulty in trimming small skin panels to exact shape when they are to cover such a difficult curved surface. The tail cones, after riveting, are mounted tepeelike on the table of the special router and the routing tool follows the edge of a steel plate built into the fixture to serve as a guide so the routing cutter can trim the skin along a straight line around the circumference.

Another interesting piece of equipment is one employed to machine accurately the landing gear attachment points on the wing. The entire center section of the wing is placed on a structural steel fixture and locked in position; then four special milling heads come into action to mill out the landing gear attachment points.

Spot Welding

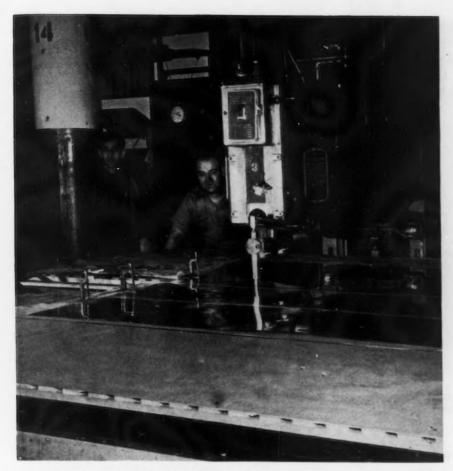
Spot welding has been limited to those points at which the design of the aircraft parts permits this method of assembly. The most important application is the welding together of the strips of aluminum which form the outer skin of the wing panels. A battery of Taylor Winfield Hi-Wave welders, each of which has a power-driven indexing table to carry the aluminum panels past the spot welding electrode, is one of the plant's interesting installations.

These welders use the principle of electrostatic discharge from a bank of condensors. The work tables are mounted in front of the welders and are about 25 ft. long and 8 ft. wide. Each table travels on ways on a bed approximately twice this length. Two types of tables are used with these welders. One consists of wooden slats closely spaced to carry the aluminum sheets. A more recent development makes use of several large sheets of pressed laminated plastic board (Formica) as the table-top covering. Each type of table-top is intended to prevent marring of the aluminum sheet.

The table unit is controlled by a cog and pawl, operated by hydraulic pressure and timed in conjunction with the spot welder. The spacing between the spots is $\frac{1}{2}$ in. and spacing is adjustable.

These strips are joined by lap welding. The overlap of each two strips is approximately 2 in. Down this overlap it is required to place three rows of spot welds. Thus the sheets and the tables on which they rest must traverse three times to complete the welding job. The sheets are $17\frac{1}{2}$ ft. long and the panel after welding is 6 ft. 6 in. wide at one edge and approximately 4 ft. 6 in. wide at the other edge. The number of spots required to put these sheets together is 11,282 for each wing skin.

The most recent of these welders has been improved in design to make it possible to weld 90 to 100 spots per min., compared with 40 to 50 spots per min. previously attained. The welding tips under these conditions ordinarily produce 100 satisfactory spots without redressing of the electrodes. For re-



POWER-DRIVEN indexing table for Hi-Wave welder which fastens smooth aluminum skin panels together. The table automatically indexes for spots approximately 1/2 in. apart.

dressing, the tips are ground to a $1\frac{1}{2}$ in. radius.

An inspection requirement is that after each redressing two sample spot welds must be made before each seam is started and one after each seam is finished. These samples are pulled in tension and are required to give a result above the minimum requirement for the sheets being welded. For each 11,282 spots, there are 312 tensile samples pulled.

This is one of the first installations of power driven indexing tables on a high speed spot welder.

Since the principal cause of poor welding has been found to be improper etching of the sheets, and consequent fouling of the tips of the electrodes, an exact cleaning procedure is followed in the spot welding of aluminum. Unless it is, the tips may become so dirty—from metal pick-up—that they will freeze in position. This metal pick-up also is the principal reason for the frequent redressing of the electrode tips.

The cleaning practice followed here is to etch each sheet along the

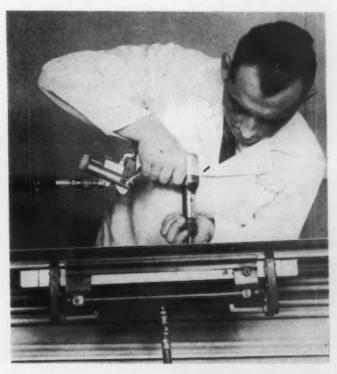
edge which is to be welded and then to wire brush the surfaces that are to be joined. The etching solution is a weak hydrofluoric acid, into which the sheet edge is dipped for a 3-min. period. The wire brushing is done with a 4-in. diameter wheel consisting of 0.003-in. wires. Naturally, the etching cleans both sides of the sheets and removes the oxide that is on the aluminum The brushing is done only on the sides that are in contact during welding.

Special Riveting Equipment

Two riveting devices that are demonstrating possibilities of simplifying and speeding up this most tedious of all aircraft procedures, are now in use. One of these consists of a simple pressure element incorporated in the rivet gun and set off by an electrical circuit established by the rivet "backer" This device decreases the demand for exact timing and teamwork between the riveter and the rivet backer, and eliminates the need for signals between the two in the coordination of their work. The second device is an air-operated automatic bar backing which acts similarly to back up the rivets, except that this bar is long enough to cover a row of a dozen or more rivets. In either instance, it is merely necessary for the riveter to feed the rivets into the prepared holes and hold the gun against the rivet head. The rivet gun begins to operate and the rivets being properly backed up and alined are

AUTOMATIC bucking bar, air operated. This bar bucks and alines rivets, freeing one worker for other necessary operations.

0 0 0





ONG-ARMED welder used on stainless parts. This is used to spot weld stringers to nacelle skins. Rotating bucks are employed to facilitate this assembly work.

headed on the opposite end. Both of these were devised by the product research engineer.

An incidental but important advantage of the automatic bucking bar is that no longer does a worker have to endure the snare drum effect of rivet bucking all day long. The bucking bar takes over the noise as well as the job of alining and backing up the rivets, and thereby frees the worker for other assembly work.

The success of the automatic bucking bar has opened new and broader applications, one of which is a fixture which will buck the rivets for an entire assembly. This will enable several workers to rivet an entire assembly at one time without removing it from the fixture, thus increasing man-hours of labor usefully employed and greatly accelerating production. In these instances the bucking bar equipment will be incorporated into the jig.

Stainless Steel Fabrication

In addition to forming aluminum parts, this concern is engaged in the forming of a number of important stainless steel parts. The simplest of these are stainless ammunition boxes for aircraft machine guns. Many stainless steel parts and nearly 30 different subassemblies, including lefts and rights, are being fabricated.

Most of the stainless parts are spot-welded together, although a few are riveted.

Included in the sub-assemblies are parts of engine nacelles. These are assembled on a buck which holds the framework in place, with the skin covering held to the framework by light steel bands running circumferentially around the subassembly. This holding method permits the parts to be drilled in a few places so Cleco pins can be inserted to hold parts together for welding. The spot welders used in this operation consist of both the pedestal-type welders and those hung from overhead trolleys.

After the Clecos are installed, the sub-assemblies are moved to a second buck or assembly jig to permit welding with a long arm welder hung from overhead. This set-up enables the operator to spot the welds rapidly in long rows, with one arm of the welder working inside the jig and the other arm moving along a fiber guide on the skin sur-

The Springback Problem

There are three principal methods used in forming stainless sheets, according to Frank E. Mc-Gary, manager of the engineering and mechanical division, which require intelligent application in order to achieve satisfactory results and particularly to overcome

the serious springback problem. These are the use of double-action dies to attain desired form: the use of brake dies for accurate control of angles and the springback of angular shapes and, finally, the use of rolls to form moldings and similar shapes without springback.

Murray makes use of each of these techniques, including doubleaction dies (made of cast iron as in automotive work), brake dies and Tishken and Yoder rolling equipment.

An example of die design and press technique in the forming of stainless is the stamping of an exhaust shroud or pipe. Here, as in fender practice and as in the Murray technique for forming aluminum sheets, the draw ring (with a restraining head) dips down to follow, as closely as possible, the deepest part of the stamping. This results virtually in a preliminary bending of the material to a shape about equivalent to the 8 in. diameter that is required in the final part. The draw ring clamps at this point and the beads hold the material while the punch comes into action to form the part in the

The Metal Forming Machine described earlier is also used on stainless parts.

All stainless steel parts are engineered to use the softest type of material wherever possible, but especially in parts requiring deep drawing. The easier jobs are made of full-hard stainless steel to obtain the higher physical characteristics inherent in this material.

The matter of selecting the type of stainless—soft or hard—to be used in any particular part is settled on the designing board. It is the usual practice to build samples by hand because, in addition to the conventional reasons, the hand building assists in finding the exact areas that will be difficult to form with dies. In this way the hand operation helps to point the way to later successful production practice, indicating modifications in design or in the selection of the material that may prove helpful.

"Hard-Sheet" Paint Shop

Partly as a means of identifying the two types of material and partly because it fits into the pro-

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duction scheme, the ST heat treated aluminum sheet is painted immediately upon arrival, after shipping containers are opened and the material has been inspected. The paint shop for this is designated the "hard sheet" paint shop. Here the sheets are hung from a monorail, with attachment made to the sheet by clamps that have broad, flat pads on them so the sheets can be hung vertically from the conveyor. The sheets are passed through an alkali wash and then into the paint spray booth. paint spray nozzles are operated by an electric eye control; as soon as a sheet enters the paint room, the spray guns are actuated and begin to operate. They traverse back and forth while chains over sprockets also operate the paint guns along a vertical traverse.

The SO aluminum material is first fabricated into parts, as de-

scribed earlier, and then painted in conventional spray booths.

To inhibit corrosion and increase the adhesion and durability of paints, the Alrock process is used in this plant as a substitute for anodizing. The Alrock process consists of oxidizing the aluminum alloy parts by immersing them in a hot solution (212 deg. F.) of sodium carbonate and potassium dichromate for about 30 min., followed by a sealing treatment in a hot 5 per cent potassium dichromate solution. (The anodizing process conventionally used is an electrolytic formation of an oxide on aluminum, using chromic acid as an electrolyte.) The Alrock process is less expensive than anodizing and frequently is known as "wet system of anodizing". It is not recognized as a universal substitute for the anodizing process, however, lacking acceptance by the naval forces.

Sprue Mill Recovers Sand

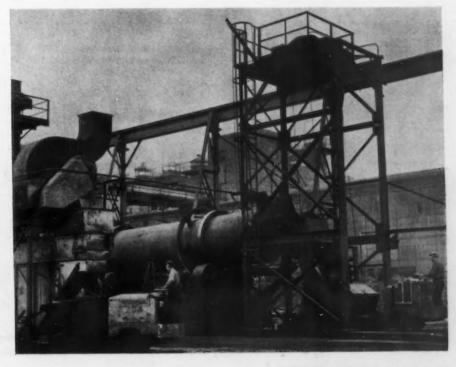
A SYSTEM of cleaning excess sand off the sprues and gates of castings before the metal is remelted in cupolas, and a means of separating all miscellaneous iron from all waste sand is in operation at the foundry of Pontiac Motor Division of General Motors Corp. The equipment consists of a sprue mill, a loading hoist, an apron conveyor, a belt conveyor, and a waste sand elevator. There is also a dust collector to remove large amounts of the dust created in the sprue mill.

This equipment will handle a mixture of sand and iron or straight loads of gates and sprues at the rate of about 30 tons per hr. Iron particles larger than 1 in. in diameter are dumped on an apron conveyor which returns them to the iron yard, underneath the charging crane. This iron is free and clean from all sand, due to the tumbling action of the sprue mill. The sand and small particles of iron pass through a screen at the end of the cylinder to a belt conveyor. This belt conveyor has a magnetic pulley which separates all magnetic material from the sand. The sand is delivered by bucket elevator to an overhead storage hopper, placed high enough so that a dump truck can be loaded from the discharge spout. Fine iron, so recovered, is carried by a small belt conveyor to

the yard underneath the charging crane.

In connection with the tumbling mill there is a large fan and dust collector that removes the fine dust from waste materials. Such dust is collected in a wet collector. About 30 tons of sand a day are removed from the overhead hopper and returned to the foundry sand system.

The remainder of it is hauled to the dump as waste. Since this system was put into operation, Pontiac has made a practice of putting all waste sand through the tumbler. As a result, it is saving about 15 to 18 tons of iron per day, formerly lost through faulty magnetic separations and in the form of sweepings on the floor.



THE IRON AGE, June 25, 1942-43

. 20-Mm. Shells Made On

N its manufacture of the 20mm. Hispano Suiza shell for use in the gun of the same name, a Missouri engineering company has stuck fairly close to the traditional shell making methods for most of its operations. However, in the interest of saving time on long machine tool deliveries as well as that of economy, the firm's engineers designed special tooling for four operations which enabled them to use standard machines which were already available in the plant at the time the government shell order was received.

These operations are (1) knurling of the band seat, (2) swaging of the band, (3) forming of the band and (4) facing the base. On the first and third operations, U.S. Standard hand millers* are used. On the swaging operation, a Toledo 20-ton punch press is employed. The facing is handled on a drill press.

Tooling on these three jobs was completely designed and built in the company's plant. Results ob-

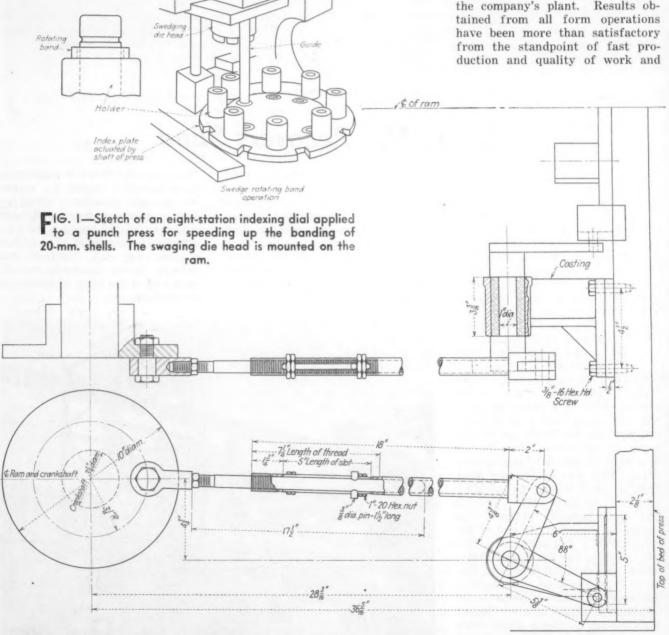


FIG. 2—Details of the connecting rod and bell crank mechanism for indexing the punch press dial shown in Fig. 1. By using interlocking tubes, a limited amount of lost motion can be provided.

Improvised Machine Tools

can be similarly applied by almost any firm engaged in the production of shell or shot or expecting to be so engaged.

Punch Press Swaging

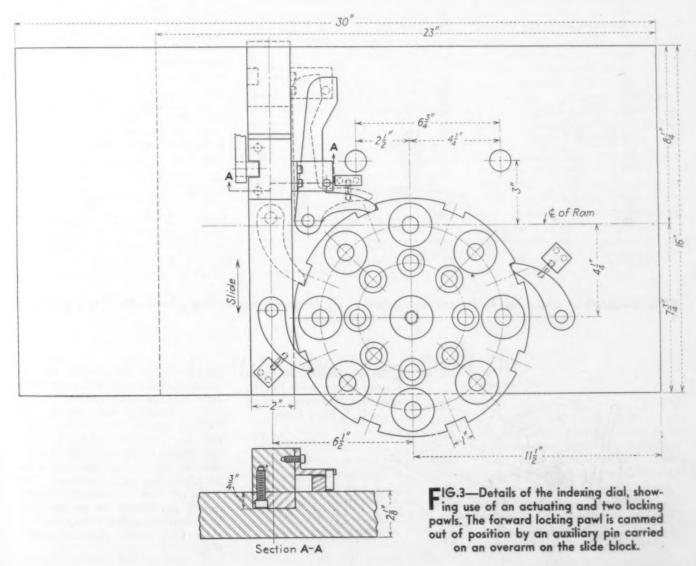
In swaging the band, the punch press was adapted to save the cost of the standard tire banding machine generally used in most shell shops. An eight-station indexing fixture or dial is mounted on the bolster plate, Fig. 1. Indexing movement of the dial is actuated by the crankshaft. As is seen in Fig. 2, lost motion of the crankshaft is provided for through interlocking tubes as a necessary step. This is required because a

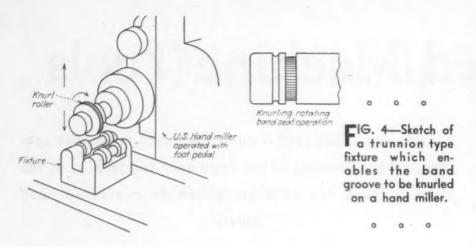
... Banding of the shell is done in a punch press with special tooling. Knurling of the band seat and turning of the band in place are both performed on converted hand millers.

full revolution of the crankshaft without lost motion would index the dial one full quarter turn instead of the 45 deg. needed for the eight-station fixture. Actually, the indexing plate indexes on the upstroke of the press. The press stroke is 3 in. which is about the minimum which can be success-

fully used. Three pawls (Fig. 3) are used respectively to index, prevent forward movement and prevent backward movement of the dial.

After the indexing dial is locked in place, the swaging die head mounted on the ram comes down and swages the band from six





sides. The shell holding receptacles must be located from the center with such accuracy that a vernier scale was employed to lay out the dial. The first dial was laid out with two stations out of center only 0.03125 in., yet this was enough to cause the die head segments to pull the band out into a shape resembling a Ubangi lip.

To further insure accurate lineup of the holders, a tapered pilot pin or guide also mounted stationary in the ram comes down with the movement of the die head and enters the corresponding bushing hole to further position and lock the dial before the start of swaging. The guide is necessary because a clearance is required for

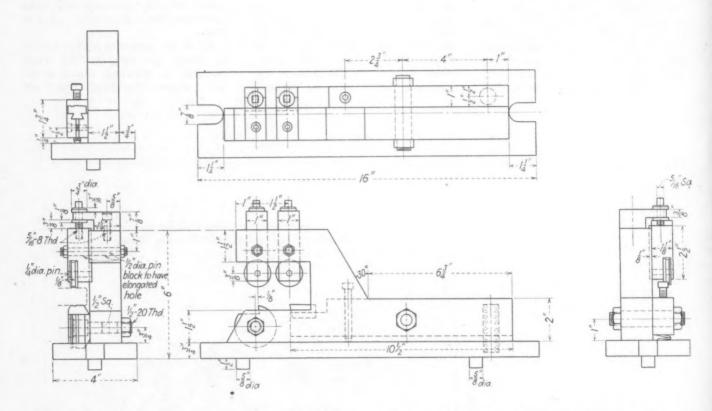
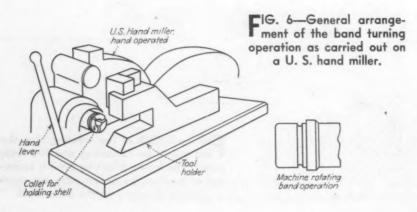


FIG. 5—Details of a form tool holder and roller follower rests designed for converting a hand miller into a shell band turning machine



the pawls in the outside dial to enable each pawl to swing out when indexing the next station.

The company has found this method capable of producing over 600 pieces an hour and the low cost and success of the operation has led several other shell manufacturers to adopt the same method. The Missouri firm is currently thinking of expanding the present dial to 16 stations which it believes will more than double present production.

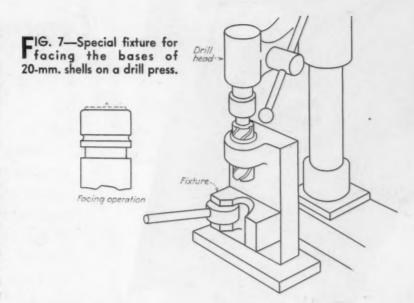
Knurling on a Hand Miller

The company's use of hand millers for several turning operations also illustrates the ingenuity of the company in making full use of the equipment on hand. Two U.S. hand millers are employed with special tooling to perform the steps of knurling and forming the band.

In the knurling operation, a two roller fixture was designed. Fig. 4. The rollers, which are 1 in. diameter each, are on fixed centers. The shell is placed on the trunnion rollers and held at the end against a plate stop. The shell is rotated when the 2 in. diameter knurl mounted on the end of the arbor is brought down into contact with it. Knurl lowers into position when the foot pedal is applied. pedal is actuated by an air cylinder of the firm's design which exerts 1600 lb. pressure on the knurl. From one to three streams of thread cutting oil can be used for coolant, the three streams being preferable to both cool and wash out chips from the knurl. Current production is around 1000 an hour, and the installation of an automatic hopper will step this up more than 50 per cent. In many shell production lines, knurling is performed on an automatic first operation machine. This company has made it a secondary operation to prevent down-time caused by inexperienced operators and because its present method yields a better knurl.

Band Forming

The same type of U.S. hand miller is also employed to machine the rotating band. Here again the tooling is the firm's own design. The machine is hand operated.



The tool holder is shown in Fig. 5 and in the perspective sketch Fig. Shell is held in an air grip collet chuck. The chucking is done pneumatically, being hooked up with the cross slide so that advancing of the slide automatically locks the shell in place and back movement of the slide automatically unlocks it. There are two tools in the fixture. A 2 in. diameter circular forming tool rough turns the band and leaves about 0.030 in. of stock to be removed by a 11/4 in. dovetail finishing tool. The rake of 20 deg. on the finishing tool must be maintained, otherwise the band will be merely rubbed instead of cut. The roughing tool is Carboloy tipped, while Stellite is used to finish the SAE 1335 hot rolled shell steel. This operation has been most successful at a very low cost and the production yield is around 500 an hour.

Another fast operation is that of facing the shell base on a drill press. The part drawing in Fig. 7 shows a dotted line over the base somewhat longer than the shell itself. Experience has shown that leaving the shell between 0.010 to 0.015 in. longer on the cut-off end and removing the burr and facing the base simultaneously on the drill press provides a uniform finish. This is necessary because a cover plate is spot welded to the base, which demands that the facing be smooth. By leaving the extra stock on the end and removing it and the nib in the present way, the life of the cut-off tool in the automatics is lengthened, thereby reducing down time for replacing and resetting this tool. The simple fixture and setup makes for a very fast operation, output being over 600 per hr.

Built-Up Welded Drill Bit

CAL S. BARDINE, who owns the Mickey Mouse Welding Shop in Keewatin, Minn., has fabricated a two-ton drill bit by means of arc welding. The 30-in. diameter tool was built for iron ore drilling in the upper peninsula of Michigan, where, according to Bardine, "drilling is tough and the men are tougher."

A manganese steel casting was used as a base for the tool. Bar-

dine's first operation was to form the face of the bit with round manganese filler bars, bonding them with stainless steel and filling with bare manganese rod. This operation was repeated until the desired 30-in. diameter was obtained. The weld metal was tapered off from the bit face for a distance of 18-in. back to the shaft shoulder. Finally, 4 in. of the edge surfaces and 4 in. of the center surfaces

Previously, these drills were forged, and reshaping was necessary after every 24 hr. of drilling. The forging was not only costly but each reshaping cost \$95. After 300 hr. of drilling, a welded bit is hard-faced in a few hours. The

were hard-faced with Stoodite.

hard-faced in a few hours. The total cost of the welded bit, which was fabricated with Hobart arc welding equipment, amounted to \$600.

DIP brush into copper sulphate and apply liberal coating to part of tool which will receive high DIP brush into copper sulphate and apply liberal coating to part of tool which will receive high coating to part of tool which will receive high coating to part of tool which will receive high speed steel tip. This solution consists of 3 oz. of speed steel tip. This solution consists of an area of sulphuric copper sulphate (blue stone) dissolved into one pint copper sulphate (blue stone) dissolved into one pint copper sulphate and added.

Cementing High Speed Steel Tips

... Here are simple, step-by-step instructions for the cementing of high speed steel tips on medium carbon tool shanks. For demonstration purposes, the operator has selected a semi-dovetail finish form tool used on a 25/8-in. Cone automatic. Heating may be done in any high heat furnace which has a gas protection curtain or uses a prepared atmosphere. The curtain or prepared atmosphere will prevent excessive blistering.

Many other applications of this tipping technique were described in an article in the April 16 issue of THE IRON AGE. Cinch steel cement is made by W. R. Chapin, Indianapolis, and is distributed nationally by the Claud S. Gordon Co., Cleveland.

Photographs by courtesy of the Timken Roller Bearing Co.

PPLY copper sulphate to under surface of high speed steel tip.



Place tip on tool shank and press firmly into position.





USING a flat stick, small metal ruler, or salt shaker, apply 1/32 in. layer of Cinch steel cement to tool while surface is still moist.



B E sure end joint is well filled, then allow tool to stand for an hour or more. The tool can then be placed in the pre-heated furnace without danger of dislodging the tip.



F tool is not allowed to stand for an hour or more, hold tip firmly in place while carrying it to pre-heated furnace.



Cementing High Speed Steel Tips



... High speed steel, Stellite or cemented carbides can be applied in tip form to low cost shank material to make a wide variety of tools. Cemented tools are practically unbreakable because the medium carbon shank is extremely tough and acts as a shock absorber, besides conducting heat away from the tip much more rapidly than does a solid tool. Tensile strength tests show that the joint of a cemented tool is just as strong as the shank material. A pound of Cinch steel cement will cement 350 tips 1 in. square.



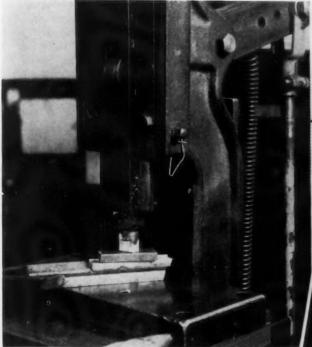
ABOVE

TRANSFER to high heat furnace, using temperature that is specified for a solid tool made of the same high speed steel you are using on tip.

LEFT

REMOVE from high heat furnace carefully and place at once on jig platform of quick-acting foot treadle press. Place small press plate quickly on tool tip.

50-THE IRON AGE, June 25, 1942



SOUEEZE out the excess cement, making sure that the tip is properly seated. Hold pressure on tip for a few seconds until cement sets. If you do not have foot treadle press, use tongs.



to about room temperature. Draw the temper as specified for the type of high speed steel used

Continuous Feed Dry Scouring of Rods and Strip

CONTINUOUS feed dry proc-A ess is announced for the removal of scale and oxide from hot rolled rods and strip. Its basic principle consists in forcing a controlled high velocity stream of angular steel grit through a long scouring chamber. Rods and strip continuously fed through this chamber are, it is said, thoroughly cleaned on all exposed surfaces in a single pass.

Drei-Brite, as the new process is called, is claimed to be dustless. and all grit passed through the scouring chamber is automatically returned for reuse, and any that passes off with the exhaust is also recaptured.

The machine illustrated is approximately 50 ft. long with a scouring chamber $7\frac{1}{2}$ in. wide and 30 ft. long. Its capacity varies from 16 strands of No. 5 to 9/32-in. rods to eight strands in intermediate sizes to ½ in. The design is adaptable for all size rods and a larger number of strands for quantity production.

The process is universal for cleaning all grades of rod and strip steels as well as copper and nonferrous alloys, according to the Dreisbach Engineering Corp., Yonkers, N. Y., which manufactures the units.

A HIGH velocity scours rods or strip as they pass through a long chamber in this Dreisbach machine.

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Sprayed Metal Bearings

... Bushings and sleeve bearings now are being made experimentally without the use of dies by spraying molten metal on a mandrel, machining the outside diameter, pressing off, and then reaming or broaching the bore. The tests described here indicate that they have a lower coefficient of friction and a higher seizure load than conventional bearings.

HE use of sprayed metal for journal surfaces is not new, but recent experiments have brought to light some interesting possibilities in using the sprayed metal technique in the manufacture of bushings and liners—the stationary members of bearing assemblies. Recent developments indicate that such parts may be made entirely from sprayed metal. The oil absorbing and anti-fric-

tional properties of sprayed metals and the fact that almost any combinations of metals, both ferrous and non-ferrous may be used, are points that should interest designers and machinery builders.

The manufacturing procedure consists in spraying a predetermined amount of metal onto an arbor which is 0.001 to 0.003 in. under finish size. The o.d. is then machined and, since only a par-

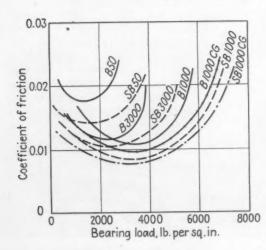
tial bond is formed on the arbor, the bushing may be pressed off. After cutting to the desired length the bushings are finish reamed or broached.

When immersed in oil these bearings will eventually absorb as much as 10 per cent of their weight, a fact which practically puts them in the "oilless" bearing category.

Spraying technique permits the combination of various metals which could not conveniently be combined either by casting or by powder metallurgy. If 0.020 in. of babbitt is sprayed on an arbor and covered with 1/16 or ½ in. of sprayed aluminum the result is a babbitt lined aluminum bearing, light yet strong. By using stainless or carbon steel as the secondary coating, a steel backed bearing can be made. Bronze, sprayed to a thickness of 0.020 in. on the arbor, can be backed with

BELOW

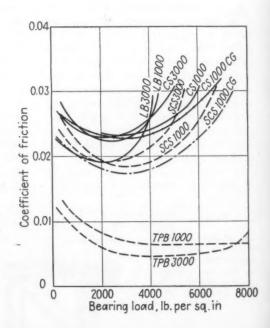
FIG. 1—Friction and seizure load tests at speeds of 50, 1000 and 3000 ft. per min. on babbitt B and sprayed babbitt SB, using plain oil and colloidal graphited oil CG.



0 0 0

RIGHT

FIG. 2—Friction and seizure load tests on lead bronze LB, sprayed lead bronze SLB, cadmium silver copper CS, sprayed cadmium silver copper SCS, and tin coated pitted back bearing TPB, using plain oil and colloidal graphited oil CG. Speeds were 1000 and 3000 ft. per min.



aluminum, magnesium or almost any other desired metal and the bond will not separate in service. Backings of stainless steel, monel or nickel are ideal for corrosion resistant applications.

Spraying Alloys

Referring to Fig. 1, a comparison of cast babbitt with sprayed babbitt, shows that the latter (SB) has a coefficient of friction about 25 per cent lower than the former at a speed of 1000 ft. per min. The sprayed babbitt seizes at 7040 lb. per sq. in., as compared with 5760 lb. per sq. in. for the cast product. At 3000 ft. per min. the seizure load is increased from 3840 to 5120 lb. per sq. in. by using a sprayed bearing.

When new, sprayed lead bronze has better anti-frictional properties than cast lead bronze. After thorough running-in, the friction of the former rises slightly while that of the latter drops until the two curves run practically to-

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It was found, however, that the seizure load of the sprayed lead bronze at high speeds is approximately 20 per cent above that for the cast product. Although lead bronze has a comparatively high coefficient of friction at all speeds compared with babbitt, it is widely used because it is not subject to cracking to the same extent as white metal under the high impulse blows delivered in modern high speed internal combustion engines. Unfortunately lead bronze is comparatively hard and has a tendency to wear the shaft unless a nitrided surface is used. It does not melt out as does white metal and therefore causes a complete locking of the shaft when seizure occurs.

Other materials such as cadmium nickel, cadmium nickel silver and cadmium silver copper have been developed with the object of producing a bearing metal free from cracking. Generally these materials have a higher coefficient of friction than the tin base bearing metals.

A cadmium silver copper tested had a higher seizure load than cast lead bronze, as well as a lower coefficient of friction. A sprayed cadmium silver copper showed an even lower friction coefficient than the cast product of the same analysis, and it too had a higher seizure load than the cast bearing.

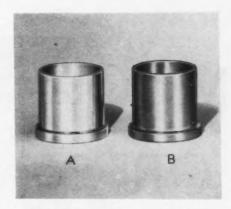


FIG. 3—Typical sprayed metal bearings. Bearing A was made by spraying a 0.020-in. coating on the mandrel and then spraying on 1/16 in. of aluminum. Bearing B is plain sprayed bronze 1/16 in. thick.

Pitted Back Tin Bearings

These experiments on friction are the work of Harry Shaw who reported them in a paper given before the British Association of Metal Sprayers. The most interesting series of tests were those made on a new type of bearing designed to have the anti-frictional qualities of a tin base metal in combination with some of the other properties considered desirable in a bearing. Of these other qualities, the principal objective was the safety factor possessed by tin-base metals-their property of melting before the shaft scores. Another point desired was the non-cracking property of lead bronze and cadmium nickel bearings.

The new bearing uses a metal of high tensile strength, with or without good heat conductivity. The surface is covered with fine pores or pits. Into these pores, which are approximately 0.005 in. deep and 0.005 in. in diameter, a tin or tin-base metal is loaded. The tin-base alloy cannot crack because it is held in the pores of the backing metal, which may be copper.

The results of tests on this bearing appear in Fig. 2, and indicate a coefficient of friction which is but a fraction of that of either lead bronze or cadmium silver. At high speeds it is but a

third or a quarter of that of these other alloys. In fact, its coefficient of friction is that of a tin-base metal, aided by the peculiar channel effect created between the tin filled pores and the copper backing. This construction aids in preserving an oil film, even at high speeds.

Strength of Sleeve Bearings

Because sprayed metal bearings are subjected to a different use than most sprayed metal coatings, it was decided to test them to see whether or not they would withstand the forces required to press them into housings by means of arbor presses.

Three sprayed metal bushings were made up for test in the Long Island City plant of the Metallizing Engineering Co. Each was 1 in. long, with an o.d. of 1.002 in. and i.d. of 0.875 in. Bushing No. 1 was Metcoloy No. 1 stainless steel; No. 2 was silicon aluminum; and No. 3 was Sprabronze. A fourth bushing (No. 4) made of pressed powdered bronze was included in the test as a yardstick to indicate the probable strength that would be satisfactory.

Plungers were made to fit each end of the bushings, so as to simulate the fittings usually used on arbor press rams for pressing in pieces of this type. The bushings were placed in a compression testing machine, between the fitted plungers, and compressed to fail-

Test Results

Bushings No. 1 and 3 failed by splitting at the end while Nos. 2 and 4 failed by bulging. The results of these tests, shown in the table indicate that all had sufficient strength to be adequate for pressing into place even under adverse conditions. It will be noted that the poorest sprayed bushing had more than twice the compressive strength of the powdered metal bushing.

A strong "oilless" bearing of stainless steel and babbitt is suggested by this test. It would be made by spraying a very thin layer of babbitt onto a mandrel, and then spraying with stainless steel.

Results of Strength Tests on Sprayed Bushings

	No. I	No. 2	No.3	No. 4
Elastic limit, lb. per sq. in	44,000	25,050	19,140	7,590
Load in lb. per sq. in. required for set of 0.002 in	53,100	26,670	21,350	8,125
Ultimate strength, compression, lb. per sq. in	78,850	53,100	30,600	15,100

HOW MUCH IRON ORE?

By B. W. CORRADO
Cleveland Editor, THE IRON AGE

HE record consumption of Lake Superior iron ore indidicated for 1942 and 1943 sets an enormous goal for the Great Lakes ore fleet during the shipping seasons of both years. Interference with American shipping in coastal waters, thereby threatening to curtail or entirely shut off imports of Latin American ore, may mean that the Lake Superior district will have to make up some 2,000,000 tons of ore which formerly was imported. Moreover, the greater use of iron ore in open hearth and bessemer furnaces to offset the declining supply of scrap may tax the Lake Superior district by some 7,000,000 to 8,000,000 more gross tons this year. In addition, blast furnace operators have been driving their units harder than ever, and in doing so are turning out more pig iron than had been expected, but at the same time are consuming iron ore that much faster. Detailed consideration of the factors outlined provides a basis for setting approximate minimums and safe maximums in our Lake ore movements for 1942 and 1943.

In order to base 1942-1943 ore requirements against some reliable yardstick, it is pertinent to consider the 1941 experience, when 55,364,577 net tons of pig iron, or 49,495,914 gross tons were produced. Recent years' blast furnace practice averaged out to 1.739 gross tons of iron ore consumed per gross ton of pig iron produced, indicating that at the most, some 86,073,394 gross tons of ore might have been required. However, some scrap is usually consumed in blast furnaces and although final 1941 statistics are not available, it is likely that some 2,000,000 gross tons of ore may have been conserved by substituting scrap, thereby reducing ore consumption in our blast furnaces to perhaps 84,-073,394 gross tons for 1941.

About 96,248,000 gross tons of ore were available in 1941, including some 2,000,000 gross tons imported. After allowing for an increase in the stock piles at furnaces and at Lake Erie docks amounting to 4,300,000 gross tons, it would appear that consumption of iron ore for the year amounted to some 91,949,000 gross tons. After deducting the blast furnace consumption of 84,073,394 gross tons, it may be assumed that prac-

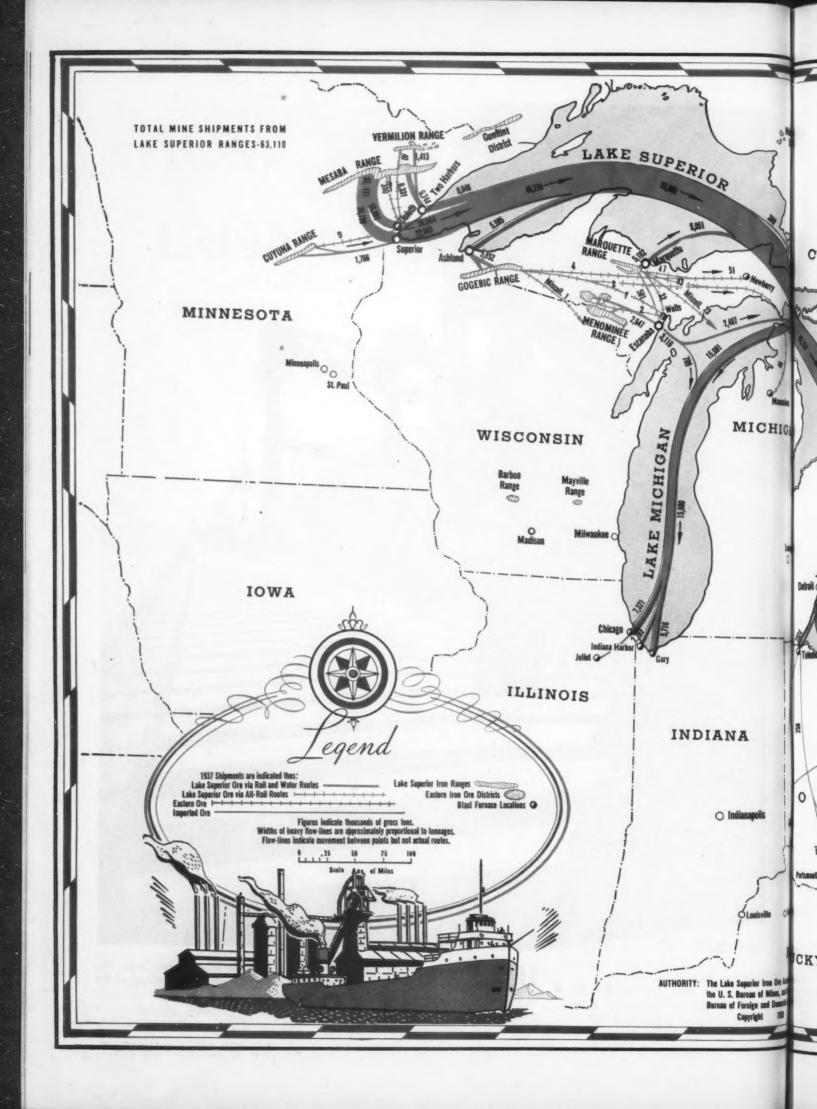
tically all of the 7,875,000 tons unaccounted for was consumed in open hearths and bessemer furnaces, largely as an oxidizer.

This analysis of the 1941 consumption experience indicates that the average charge in open hearth and bessemer furnaces amounted to 50.7 per cent pig iron, 40.9 per cent scrap and 8.4 per cent iron ore. This compares with a normal practice of 50 per cent pig iron, 45 per cent scrap and 5 per cent iron ore. However, the continued shortage of scrap, intensified during the latter part of 1941, forced the use of larger amounts of pig iron, thereby requiring increased iron ore and/or limestone as oxidizing agents to eliminate the higher carbon and silicon impurities. Any increase in limestone in the melt would only add to the slag, and create an undesirable condition. Thus, it has been more advisable to increase the iron ore to check the impurities, and leave the ratio of limestone to the melt constant. Although 7,875,000 gross tons of iron ore were used in the open hearths and bessemer furnaces in 1941, experts believe that 15,000,-000 gross tons of ore will be consumed in steel making this year.

In feeding iron ore into the open hearth, the "charge" ore is usually dumped into the furnace upon the limestone, and it is then covered with steel scrap, iron



UNLOADING iron ore at the Gary works of Carnegie-Illinois Steel Corp. The different positions of the bucket legs give a general idea of the travel of the unloading legs.



DETAILED breakdown of the movement of iron ore down the lakes and by rail in 1937. Although the experiences for 1942 and 1943 will be somewhat different, the relationships in the volume of the movement by districts will be similar. Map by courtesy of Lake Superior Iron Ore Association. Moose Mtn. District C N Georgian Bas HAMPSHIRE D AKE HURON Standis 124 Miscell NEW LAKE ONTARIO Clint 139 MASS YORK LAKE ERIE HEW YORK NEW
AND
PENNSYLVANIA CONN MINE SHIPMENTS 2547 PENNSYLVANIA 23 NEW JERSEY WHEELING EASTERN PENNSYLVANIA AND MARYLAND DISTRIC 0 H 0 I WEST VIRGINIA O Charleston VIRGINIA CKY

and/or hot metal. The "work" ore is the "lump" ore that is later charged into the furnace through the slag to speed up the neutralizing of the impurities. It is estimated that about 1,450,000 gross tons of the 1941 ore consumption represented "lump" ore, but it is unlikely that this amount could be increased to represent a sizable portion of the 15,000,000 gross tons of ore estimated to be required for the 12-month period ending April 1, 1943. "Lump" ore in its natural state is high in iron, low in phosphorus, low in silica, and these characteristics make it highly desirable for use in the open hearth. Nevertheless, it is likely that larger amounts of the lump ore will be available from the Marquette and Vermilion ranges, as well as from the Adirondack district. The balance will be made up of sinter and beneficiated ores.

If American blast furnaces produce some 61,259,000 net tons of pig iron during the 12-month period ending April 1, 1943, and about 12 per cent of this is used in foundries, the balance of approximately 53,500,000 net tons would be available for our open hearth and bessemer furnaces. This amount of iron plus perhaps about 16,500,000 tons of purchased scrap would indicate a potential steel production of approximately 86,000,000 net tons. However, if the estimate of some authorities is accepted that 15,000,000 gross tons of ore will be fed into the open hearths and bessemer furnaces, and allow for a 40 per cent melt realization of the abnormal amount of ore fed into the furnaces, it is not unlikely that the total steel production may be pushed up to some 89,000,000 net tons in the 12 months ending April 1, 1943. In any event, this abnormal use of iron ore would result in average open hearth charges of approximately 49.7 per cent pig iron, 34.7 per cent scrap, and 15.6 per cent iron ore.

To produce 61,259,000 net tons of pig iron for the April 1, 1942, to April 1, 1943, year, approximately 95,237,284 gross tons of iron ore would be required. To this, we would have to add some 15,000,000 gross tons of ore to satisfy normal open hearth and bessemer requirements and to offset the scrap shortage. In addition, there must be added the requirements of some 2,600,000 gross tons to go to Canadian blast furnaces located in Ontario, so that

they may produce approximately 1,470,000 gross tons of pig iron. These relatively conservative figures indicate that 112.837,284 gross tons of iron ore will be required for the 12 months following April 1, 1942. (See Table I). Of this total, some 15,000,000 gross tons might be secured from mines other than the Lake Superior district. If allowance is made for estimated Lake Superior iron ore stocks of 20,238,000 gross tons, at Canadian and United States furnaces and at Lake Erie docks, as of April 1, 1942, this would indicate total Lake ore requirements of 77.599.284 gross tons as the minimum movement for the current lake shipping season.

However, Lake Superior ore interests usually feel safe when there are at least 12,000,000 gross tons of ore on hand on April 1 to guard against bad weather and a late opening of Lake shipping. Being conservative and merely allowing for some 8,500,000 gross tons of ore to be on hand on April 1, 1943. about 86,099,284 gross tons would have to be moved down to the lower lakes in 1942. But, if this amount were moved, it would be necessary to move some 108,026,800 gross tons in 1943, and this would appear to be a physical impossibility. It would, therefore, appear more practicable to bring down as much as possible this year in order to relieve the pressure in 1943. Taking the various uncertainties into consideration, it would seem that the safest tonnage movement for this year would be about 89,-876,084 gross tons down the Great Lakes, and an additional 1,750,000 moved all-rail to consuming districts. The office of Defense Transportation has asked lake shippers to bring down at least 88,000,000 gross tons of ore this year.

During the 1943 "ore year" about 104,000,000 gross tons will be required for our potential pig iron output of 67,259,000 net tons; some 3,000,000 gross tons needed for Ontario's blast furnaces and perhaps 17,500,000 gross tons will be used in open hearth and bessemer furnaces. This would indicate total needs of 124,526,800 gross tons, of which some 17,000,-000 tons might be forthcoming from non-Lake Superior sources. The net difference, 107,526,800 gross tons of iron ore would appear to be the indicated 1943 movement, which might include about 2,500,000 tons moved by rail. If we make allowance for a slightly

higher "safe leeway" of 9,000,000 gross tons to be on hand at the start of the 1943 ore movement, a total ship and rail movement of 108,026,800 gross tons would be necessary. Apparently then, it will behove lake shippers to move a total of 190,000,000 gross tons of ore during the 1942-1943 shipping season, if at all possible.

The uncertainties surrounding whether or not pig iron output will be pushed even higher than estimated above, by means of air-conditioning, the installation of more blowing or more stove equipment. are fairly well offset by probable furnace breakdowns and enforced idleness for repairs, since estimated output made no allowance for probable repairs. However, a factor which lends strength to more favorable estimates is the increasing practice of beneficiating, screening and sizing. Table II indicates the record amount of concentrates shipped in 1941, and plants recently completed or now under way will permit an even greater tonnage of concentrates to be shipped in 1942. This will aid blast furnace practice and reduce the loss of shipping space carrying moisture or waste.

Lake Shipping Capacity

In the 1941 shipping season there were 293 American ore boats and barges carrying this cargo down the lakes. In addition, some 32 Canadian ships aided the ore movement partly by scattered trips. The total bulk traffic moved by lake shipping up and down the Great Lakes in 1941 amounted to:

Iron ore (80,116	360	g.t.)	 Net Tons 89,730,323
Bituminous	coal			 49,733,234
Anthracite				
				11,387,480
Limestone	(15,74	4,150	g.t.)	 17,633,448
Total				 169,020,975

Of these movements, the transport of limestone and grain, as well as iron ore, was down from the head of the lakes, while coal was moved in the opposite direction.

This year's ore fleet consists of 299 United States ships (including five converted auto carriers and 2 recommissioned old boats) available having an estimated 2,729,540 gross ton trip capacity based on 20-ft. draft. In a 30-trip season this fleet might easily transport 81,796,200 gross tons of ore. However, lake shipping has been allowed a deeper load-line for spring and autumn, and this may permit the loading of an additional 2,000,-

000 gross tons. Besides this, the five new Pittsburgh Steamship Co. large boats to be launched this year may add 1,500,000 gross tons to the ore fleet's 1942 capacity, and this would give us 85,296,220 gross tons on a 30-trip basis. However, the speeding of the movement by diverting some of the unbound coal to the railroads and reducing the transport of grain and limestone could easily permit the carriage of some 5,000,000 additional gross tons of ore, while greater cooperation from Canadian shipping this year might permit the movement of another 2,500,000 gross tons. This would indicate a conservative shipping capacity of 92,796,000 gross tons of ore.

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All in all, solely considering the ore movement in itself and the fact that shipping started very early on the lakes this year, it is possible that this year's movement by the ore fleet may be as high as 90,000,000 gross tons.

Shippers usually made it a practice to load their boats with coal on the return voyage to the head of the lakes in order to increase the pay load of each trip and frequently interspersed their ore trips with a few voyages during which grain, a highly profitable commodity, is carried down the lakes. However, late in April, Joseph B. Eastman, director of the Office of Transportation, recom-Defense mended that shippers eliminate the practice of transporting coal eastward from Ashtabula and other Lake Erie ports to Buffalo, and to curtail the water transport of coal to Lake Michigan by lake shipping. Co-ordinator Eastman also recommended that as much as possible of the grain and limestone be diverted from movement by ships.

The grain movement, which totaled some 11,387,480 gross tons last year, has many serious aspects, particularly in view of the fact that there is insufficient storage space at the lake heads to hold the present stores and the 1942 new crop. The record pressure that is being placed upon the nation's railroads to transport enormous cargoes from coast to coast indicates that the entire grain movement from the lake heads could not be diverted into all rail traffic. Since enormous amounts of grain are stored at various points throughout the country, it is unnecessary that this grain be moved to lower lake ports, except for the reason that there is not enough storage capacity at the lake heads,

TABLE I

Approximate	Iron Or	e Requirements	From April	1 1942 +0	April 1 1944

	Gross Tons of Ore Needed April 1, 1942 to	Gross Tons of Ore Needed April 1, 1943 to
	April 1, 1943	April 1, 1944
U. S. blast furnaces will need (to produce 61,259,000 net tons of pig iron for the 4/1/42-43 year and		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
67,259,000 net tons for the 4/1/43-44 year.)	95,237,284	104,026,800
Ontario blast furnaces will need	2,600,000	3,000,000
Approximate normal openhearth needs, plus add'l ore to offset scrap shortages at openhearth and Bessemer		
furnaces	15,000,000	17,500,000
TOTAL U. S. IRON ORE REQUIRED		124,526,800
Probable ore that will be shipped from mines other than the Lake Superior District		17,000,000
TOTAL LAKE SUPERIOR ORE NEEDED	97,837,284	107,526,800
LESS APRIL I U. S. AND CANADIAN STOCKS Minimum ore needed to maintain operations to April I		8,500,000*
of following year This makes no allowance for April requirements, in the event of a late opening of the Lake shipping sea-		99,026,800
son.**—Minimum April needs		9,000,000
TINUED OPERATIONS TO MAY I		108,026,800
PROBABLE RAIL MOVEMENT		2,500,000
AMOUNT TO BE MOVED BY LAKE SHIPPING TO RELIEVE SOME PRESSURE FROM LAKE SHIPPING		105,526,800 HT BE ADVISABLE
TO BALANCE THE MOVEMENT FOR BOTH YEARS		
PRACTICAL OR DESIRABLE BALANCE		000,000,000

NOTES: *The indicated 8,500,000 gross tons is merely the minimum desirable stockpile that should be on hand April 1, 1943, and the actual position will be increased by whatever extent shippers exceed the 86,099,284 gross ton 1942 "minimum" movement.

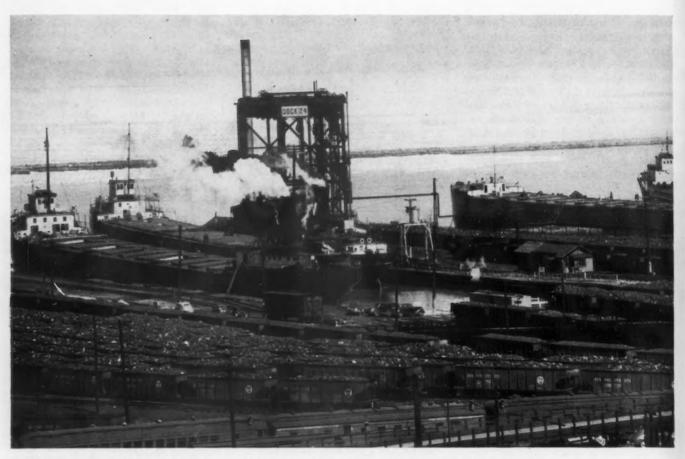
** Since 1916, Lake shipping has opened four times in May and in three other years on April 28-30, so that minimum stocks should cover April needs fully. Lake shippers usually feel safe with 12,000,000 gross tons of ore on hand April 1.

LEGEND: Estimates are based upon the actual experience of recent years as reported by the U. S. Bureau of Mines, the Lake Superior Iron Ore Assn., and the Dominion Bureau of Statistics.

TABLE II

Estimates of Iron Ore Mined and Shipped in the United States in 1941

	and /	Actual Output in 19	40			
		ned (G.T.)		Ore Shipped (G.T.)		
	1940	1941	1940	1941		
District						
Lake Superior:						
Michigan	12,472,448	14,813,000	13,751,970	15,289,000		
Minnesota	47,736,810	62,886,000	47,904,137	62,543,000		
Wisconsin	1,262,065	1,431,000	1,227,840	1,483,000		
	61,471,323	79,130,000	62,883,947	79,315,000		
Southeastern States:						
Alabama	7,316,127	7,870,000	7,330,412	7,896,000		
Georgia	101,286)	100,342)		
Mississippi)	n nan)			
Tennessee Virginia	23,237	81,000	23,088	81,000		
	7,440,650	7,951,000	7,453,842	7,977,000		
Northeastern States:						
New Jersey	659,425	651,000	693,998	667,000		
New York Pennsylvania	2,900,499	3,324,000	2,942,948	3,296,000		
	3,559,924	3,975,000	3,636,946	3,963,000		
Western States	1,224,002	1,443,000	1,223,349	1,429,000		
Grand Total	73,695,899	92,499,000	75,198,084	92,684,000		



ORE boats at Cleveland taking on cargoes of coal for transport to the head of the Lakes, where ore will be taken on for the down-lake movement. The railroad cars shown here loaded with coal, after being emptied, will be available for loading with ore for transportation to inland furnaces. Thus, diversion of too much of the Lake coal movement might result in car shortages along Lake Erie.

so that if the storage inadequacy were overcome, the movement might be delayed to a more opportune season. Most grain men believe that increased use of temporary storage on farms is the best solution to the problem. This, plus some movement by rail and by Canadian lake shipping, may relieve considerable shipping space for concentration on the ore movement.

There are similar considerations which militate against the blanket stoppage of any movement of coal in order to favor the ore tonnage that will be carried. It must be appreciated that a continuity of the movement of the ore from lake ships to docks to waiting freight cars is of great importance. Thus, if too much of the coal movement up to the head of the lakes is diverted by rail, there may be a shortage of empty railroad cars at lower lake ports to transport the ore to ultimate furnaces in various inland areas. As long as a certain amount of coal is carried, the empty freight cars at lower lake ports can be easily reloaded with Lake ore interests recall that in the last World War there was an insufficiency of railroad cars at lower lake ports, thereby interfering with the movement of ore to the blast furnaces. They point out that there is a possibility of the recurrence of this danger during this year or next year.

The high level of efficiency in the dispatching of ships in the lake traffic witnessed late in 1941 is expected to be maintained throughout the current season by shipping authorities. Plans have been made to permit the continued "swapping" of cargoes by various ore shippers to minimize delays in unloading and reloading, and permit a greater number of trips per ship during the season.

Lake Mining Capacity

Mining authorities believe that existing Lake Superior mining facilities can make possible the production of 90,000,000 gross tons of ore this year. In the fall of 1941, mine owners placed orders for mining equipment, trucks, and Diesel locomotives and much of this material has been received with

some still on order. The mine owners have also been operating their underground mines during the winter, and when possible, stripping operations were conducted for open-pit mining at new locations. Moreover, the railroads carrying the ore from the mines to the docks have also added to their rolling stock and made other repairs and improvements.

So far as non-Lake Superior properties are concerned, it is encouraging to note that expansions and new developments are under way in New York, New Jersey, Alabama, Texas and other states, and the increased production that will result should easily offset our pre-war imports of some 2,000,000 tons of ore annually. There are indications that production in nonlake areas will increase by a greater margin during the war, and thus somewhat alleviate our dependence upon the Great Lakes area. This will be a help to the sorely-pressed lake fleet, but Lake Superior ore should continue to comprise some 85 per cent of total United States output for many years to come.



THE Society's new president, Charles C. Conley, of the Stolle Corp., Sidney, Ohio.

Electroplaters Discuss Armament Applications

HE technical and educational sessions of the 30th Annual Convention of the American Electroplaters' Society held in Grand Rapids, Mich., June 8-10, were devoted almost entirely to military applications of metal finishes: electroplates, phosphate coatings and organic coatings. One of the most important sessions was in the nature of a symposium by members of the staff of the War Production Board, on the condition of our metal supplies and their availability for electroplating purposes, as well as the main uses to which electroplating may be put in the war program, both for improvement of the product and for saving huge quantities of solid nonferrous metals which would be replaced by electroplates on ferrous

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The chief of WPB's electroplating section, consumer's durable goods branch, W. W. McCord, briefly reviewed the supply of metals important to the plating industry. Aside from the well known situation in copper, aluminum and tin, he indicated that while chrome was tight there might be enough from Montana ores for chromic acid by the end of 1943. Many specifications calling for cadmium have had to be changed, there is not nearly enough to take care of war demands. He also remarked that there was no hope for improvement in our insufficient nickel supply.

metal bases.

For civilian work the plater may still use lead, zinc, silver and gold. . . . Thirtieth annual convention of American Electroplaters' Society covers conservation of critical metals; copper, chromium and organic finishes; oxide and phosphate coatings; iron, indium and lead plating; surface treatments for aluminum and magnesium; and the effects of surface finish on the protective value of electroplated coatings on steel.

Regarding the expense of silver and gold, it must be remembered that we are operating in a pegged market; that if it were free, nickel and perhaps tin might well rise into the precious metal class.

The plating industry is comparatively lucky; it has not been ordered to stop; it has war work to do. Other industries have been stopped completely. However, the future may still be hard for the individual plater. There is not enough work to go around. It is estimated that although plating for war work will increase. it will not amount to more than 50 per cent of pre-war plating, on the average. A large part of this will be in the new strip lines for electrolytic tinning, and in pre-plating, which requires new equipment. Therefore, war plating will require only about 35 per cent to 40 per cent of present equipment.

Color Photography

The paper given by F. K. Savage and P. R. Pffefferle, of C. G. Conn, Elkhart, Ind., consisted of a series of studies of acid copper, acid zinc, cyanide copper and nickel solutions wherein the appearance of a highly magnified section of the electrodes was shown in a colored film.

One of the most interesting views in this film showed the action of a bipolar conductor (a conductor placed in the solution between the anode and cathode, but without electrical connection) in nickel and in silver solutions. In this picture, the action was clearly shown, of deposition of metal from the anode on the cathodic end of the bipolar conductor, and corrosion with gassing of the anodic end; also a heavier plate on the cathode.

Another striking view illustrated the difficulty of covering soft solder with silver in recessed brass work, due to the potential generated by the cell action of soft solder and brass which is sufficient to oppose the deposition of silver at that point or even to remove a thin, inadequate silver strike.

Another view included an acid copper cell which showed the blue copper sulphate solution next to the anode; and the movement of the solution—up along the cathode and down along the anode.

A solution containing ammonium sulphate and ammonia provided a

^{*} Alumilite Process No. 210, Aluminum Company of America.

spectacular exhibit of the anode film, the formation of a heavy concentration layer at the bottom of the solution and a lighter secondary layer above it; the last being formed by diffusion from the face of the electrode. Air agitation reduced the concentration film to a minute thickness. Polarization was shown by loose and undissolved particles on the anode.

A cold nickel cell was shown, operated at pH 5.4 colorimetric, to produce pits. Hydrogen bubbles in large numbers were seen adhering to the surface. The addition of "anti-pit" agent, without stirring, resulted in complete disappearance of the bubbles.

Other pictures showed treeing in a lead fluoborate cell, an acid zinc cell, acid copper and nickel cells.

Passivity

In order to be passive, a metal must satisfy three requirements: It must (1) Form an oxide film or conveyance film which is insoluble; (2) The film must be continuous, and (3) The film must be adherent.

Although no material is completely insoluble and a completely continuous and adherent film is a rarity, we have some striking examples, such as: aluminum in air and water; nickel; lead in dilute sulphuric acid; iron in concentrated sulphuric acid; iron and steel with over 11 per cent chromium; and perhaps most interesting, magnesium in hydrofluoric acid.

If the surface film is ruptured, passivity is immediately broken down. The halogen (chlorine, bromine, iodine) acids and halides are the most notorious film dissolvers, attacking the most passive films with the formation of soluble halides; even nickel, aluminum and stainless steels.

Passivity may be defined as the behavior of many of the metals above hydrogen in the electromotive series (the "non-noble" or "base" metals) in atmospheres and media containing oxygen or film forming anions which are rather insoluble, adherent and continuous. This subject was covered by Major F. A. Rohrman, office of the commanding general, 6th Corps Area, Chicago.

The availability of any type of finish is directly related to the availability of the scarcest ingredient in the formula. The availability of finishes for non-essential civilian use is small. Nevertheless, some finishes are



GEORGE WAGNER, named first vice president, is associated with the Hy-Grade Electroplating Co., Newark, N. J.



MAURICE R. CALDWELL, Grand Rapids, Mich., was named second vice president.

available, although they are not of the high order of excellence to which industry is accustomed. A general change coming into commercial finishes is the trend toward slower drying or longer initial setting-up periods.

According to C. A. Lankau, Egyptian Lacquer Co., New York, who presented this subject, all finishes are available for work with high preference ratings. These include: nitrocellulose lacquer; oil base or synthetic paint; acid-proof black paint; high resin phthallate; zinc chromate primer; and so on, to meet all specifications of the government procurement agencies.

Radiant Heating

P. H. Goodell, of the C. M. Hall Lamp Co., Detroit, who prepared the material listed in Table I. discussed radiant heating. Mr. Goodell noted that in conventional baking, the transfer of heat occurs by conduction, convection or radiation; in infra red or radiant heating, by the direct delivery from the source to the intended work. It will pass through air and some types of glass without heating to any appreciable extent. It reaches its limit only when the surrounding air reaches as high a temperature as is practical (from the heated metal part). The higher the temperature of the surrounding air, the more efficient the system; and this condition can be realized by fully enclosing the entire system in a zone oven. The first is the "entering" or preheating zone which uses only the hot air from the radiant system; then comes the zone of high energy concentration with radiant heat sources, 1000-watt lamps; then the low concentration zone with lamps spaced at wide intervals, where the temperature is held but not increased; lastly, the heat retention zone with no lamps.

Oven design must take into consideration (1) dimensions of the pieces to be treated; (2) thermal characteristics of these pieces; (3) temperature requirements; (4) time cycle requirements; (5) safety considerations; (6) continuous or batch operation; (7) equipment already on hand; (8) necessary controls. The work should present as much surface as possible to the Open hanging centers lamps. should be avoided. Articles formerly considered untreatable by this method are now being baked satisfactorily in a radiant heat

Some of the advantages of radiant heating are obvious, such as elimination of warming-up period; cleanliness; saving in floor space, visibility of operations at all times. In addition, however, there is the ability to shut down during a short stop or lag (like lunch hour or a break-down) and start immediately afterward; its flexibility and the ease of making additions, extensions, changes, etc.; and very important—the low cost of installation.

Electric Spraying

Coating by the electric spray method was the title of the paper given by Harold Ransburg, Harper J. Ransburg Co., Indianapolis. The paper describes a new method of applying coatings to articles pro-



THIRD vice president is Clar-ence C. Helmle, of the General Electric Co., Bridgeport, Conn.



W. J. R. KENNEDY was elected to the post of executive secretary.

ducing a more uniform film and effecting a large saving in material used. By this method, the grounded article being coated is surrounded by an electrical field which imparts an electric charge on the work in such a way as to cause the particle to be attracted to the piece being coated. The current is provided by a power pack, specially designed to produce a high voltage (of the order of 100 kv) and a low amperage (not over 10 milliamps). Direct current is essential, but the volume of current used is neg-

The guns are of standard make, air operated, automatic type, able to atomize liquids completely at relatively low air pressure. Although conditions are variable, the most satisfactory results have been obtained with 10 lb. air pressure and about 1 lb. fluid pressure. As the conditions vary to suit the specific job, the flow of liquid must also be varied, as well as the size of the fluid tip, the atomizing pressure, etc. It is important to correlate the inertia of the paint particle with the intensity of the electric field through which it is moving.

The position of the spray gun, though variable, should be such that the axis of the spray is at an acute angle to the line of travel of the work; normally, about 15 deg. The spray gun may remain in continuous operation. As the pieces pass through the field, each picks up its share of the coating material. Intermittent operation may be set up by the use of the electric eye or a timing relay for actuating a magnetic air valve which will in turn operate the gun.

The paint required is in no way different from that used in conventional finishing practice. It is best. however, that the solvents be adjusted to keep the film open a little longer than in normal usage.

A striking illustration is a design in which a grounded object was suspended about 2 ft. before a spray gun and received a direct spray for about 3 sec. Surrounding the piece with an electric field resulted in the paint spray not only coating the facing side of the work, but traveling past the work, then changing its course of travel by 180 deg. and returning to coat the back of the piece being coated. To be sure, this phenomenon is not reproducible on a large proportion of commercial work, but it is an interesting example, nevertheless.

It is estimated that paint consumption on items like refrigerators can be reduced by 40 per cent.

As regards limitations, protruding edges and recessed sections are difficult or may be impossible to coat uniformly. However, the work does not have to be perfectly smooth in order to take a good coating.

A complete summary of the equipment required for applying organic finishes featured the presentation of F. H. Edwards, De Vilbiss Co., Toledo. Practical production coating systems, as outlined by the author, include: brushing, dipping and spinning, roller and knife coating, as well as tumbling or barrel coating and centrifuging. Other practical production systems are flow coating or cascading, screening, impregnation and spray-

Spraying is used for 75 per cent of the industrial coatings. It is applicable to all materials, including the widest ranges of specific gravity and viscosity, and the most rapid drying. It provides any coating thickness desired, in one or more coats, to any part of the object, and on any shaped object. Other methods may provide greater speed. but often at the sacrifice of quality. They may also be better for special circumstances.

Equipment for spray painting may be hand operated (gun and work manipulated by hand); semiautomatic (gun operated by hand with work brought to the sprayer); or fully automatic (both gun and

work machine-operated).

Hand operated equipment consists of (1) spray gun; (2) the airregulating and purifying devices; (3) material feed systems; (4) air and fluid hose connections; (5) the air compressing unit; (6) exhaust equipment. Manually operated guns are classified according to size from the largest (the production type) to the smallest (the artist's brush); also by their working principle: (1) separate or attached container; (2) suction, pressure or gravity feed; (3) internal or external mix; (4) special, with extensions, to spray at various angles.

Of utmost importance is the proper choice and care of the air cap and fluid tip combination of the gun. The most important data for this purpose are: (1) the size and shape of the work to be coated; (2) consistency of the finishing material; (3) type of feed to

The average spraying speed of the production gun is 1000 sq. ft. per hr. upward. Because the separate container gun may be used with all types of material feed, it is the most popular. Internal mix is best suited to the slower drying materials which will not clog the

Air regulating and purifying devices are essential to quality finishes. Often special condensers are required in the main air line to remove excess moisture.

Suction feed is the simplest type and is suitable for small quantities of light low viscosity material. Pressure feeding is the most recent and most efficient. Gravity feed is

Hose for air and fluid should be large enough to prevent undue internal friction and reduction of pressure. For the source of air it is often most economical to use small individual compressors in separate departments.

Every possible precaution must be taken against fire hazard: nonsparking, totally enclosed electrical devices, lights, switches, etc.; separate storage for finishing materials; a sufficient number of properly placed fire extinguishers; properly grounded spray booths, fans, etc.; adequate exhaust equipment.

Spray booths are made in floor, leg and bench types. The latest development is the water-wash booth in which the pigment-laden air is passed through a series of water sprays which drive the pigment into a reservoir at the base of the exhaust chamber.

The canopy type booth is designed for large objects, up to railroad cars in size. It is suspended from the ceiling, hanging just above the object to be coated. It is replacing tunnel booths.

The finishing department should be so located as to be free from dust and dirt. If possible, it should be air-conditioned, with temperature and humidity control.

Phosphate Rust-Proofing

Phosphate coatings have in many instances proved satisfactory substitutes for metallic coatings on steel, under present circumstances. Phosphating is the term applied to the treatment of iron, steel, zinc and their alloys to convert their surfaces to metallic phosphates. The commonly known trade names for this process are Parkerizing and Bonderizing. Parkerizing produces a corrosion inhibiting and oil absorptive phosphate; Bonderizing, a phosphate coat adapted to increasing the adhesion of any applied paint finish.

Parkerizing requires no critical materials. The parts, free of grease, oil and scale are immersed in the hot phosphating solution for 30 to 60 min., removed, dried and finished with a rust-inhibiting oil. This coat imparts no material

change in dimensional tolerances, although a build-up of 0.0001 to 0.0003 in. may result. The finish is black, non-reflective and adherent. It is used widely on rifles, bayonets, machine guns and mounts, ammunition links and clips.

A modification of phosphating, known as Parco Lubrizing is used to protect moving parts against wear: cam shafts, pistons, rings, valve tappets, etc. The coating consists of an admixture of iron and manganese phosphate. The build-up is 0.0002 to 0.001 in. Since the change in dimensions takes place largely in the non-metallic coat and not the metal, it is not customary to change the dimensional tolerances. Some recent applications are pistons and liners for Diesel engines for planes, tanks and ships; clutch parts and suspension units in tanks; functional parts of machine guns.

Steelbond, a corrosion-resisting and paint-holding steel sheet was developed to replace zinc. The finish is an electrodeposit of zinc 0.00002 to 0.00005 in., followed by Bonderizing. The outer layer of the zinc is converted to a water insoluble phosphate with a layer of zinc between it and the steel. The sheet requires 3 to 5 lb. of zinc per ton of 24 gage steel, against the conventional hot-dip coat of 200 lb. zinc per ton of steel. They can be formed, drawn and fabricated and later painted.

Bonderized black plate is recommended for caps, crowns and cans. It can be drawn, bent and rolled. The paper on phosphate rust-proofing was the work of V. M. Darsey, Parker Rust-Proof Co., Detroit.

An interesting study and review of the use of copper in selective carburizing was presented by M. M. Thompson, National Cash Register Co., Dayton, Ohio. The author began his paper with a brief history of selective carburizing, mentioning all the methods in use at one time or another, with varying degrees of success, as follows:

- 1. Immersion deposits of copper from sulphate and chloride baths.
- 2. Shrink on steel sleeves and remove later.
- 3. Electrolytic deposits of copper from cyanide and acid baths.
 - 4. Electrodeposited nickel.
 - 5. Electrodeposited tin.
- 6. Sprayed metal coatings (Schoop process).
- 7. Leaving critical surfaces slightly oversize and grinding off the excess case.

TABLE I
Specifications of Naval and Military Finishes

Consuffication		Main		Drying Schedule				
Specification Number	Coating	Component	Uses	Convection	Radiant			
PXS 783	Zinc chromate Primer	Glyceryl phthallate	Ammunition corrosion inhibitor. Corrosion inhibiting priming coat on metal structure parts	136 hr. at 160 deg. F.	30 sec 1½ min.			
Army Air Corp 14080	Zinc chromate metal primer	Glyceryl phthallate		10 min. at 160 deg. F.	30 sec.			
Navy Airo P-276-Z	Zinc chromate primer	Glyceryi phthaliate	Corrosion inhibitor for aluminum alloys or steel	1½ hr. at 160 deg. F.	20 sec 1½ min.			
QMC-ES 3596	Rust Inhibiting primer	Glyceryl phthallate	Army vehicles, artillery components, tanks, etc.	30 min. at 200 deg. F.	4½ min.			
HQD-ES 680	Rust inhibiting primer	Glyceryl phthallate	Army vehicles, ordnance, artillery components, etc.	1 hr. at 180 deg. F.	4½ min.			
Army 3-162A	Lacquer for ammunition	Nitrocellulose	Protection and Identification of ammunition	15 min. at 180 deg. F.	30-40 sec.			
Army 3-106E	Acid proof black	Bituminous base	Inside coating on shells, bombs and land mines	30 min. at 180 deg. F.	4½ min.			
Army Air Corps 14105	Camouflage lacquer	Nitrocellulose	Camouflage over primer	10 min. at 180 deg. F.	30-47 sec.			
Navy E 5e	Aircraft enamel	Glyceryl phthallate	Exterior coatings for metal and fabric; also aircraft parts	15 min. at 300 deg. F.	8 min.			
Navy E 6e	Black enamel	Glycerys phthaslate	Aircraft engine cylinders and instruments	15 min. at 300 deg. F.	8 min.			
QMC ES 4746	Lustreless olive drab	Glyceryi phthallate	Army vehicles, tanks, pontoons and artillery components	1 hr. at 250 deg. F.	4½ min.			
HQD ES 680	Lustreless olive drab	Glyceryl phthallate	Automotive products	1 hr. at 250 deg. F.	4½ min.			
ES 5108	Stenciling enamels	Giyceryi phthaliate	Lettering on exposed surfaces	39 min. at 200 deg. F.	3 min.			
T 1103	Olive drab	Glyceryl phthailate	Portable landing mats	1 hr. at 300 deg. F.	5½ min.			

• • • Any finish that can be baked at all can be baked with infra red radiation. The finishes best suited to the speeding up process are formulated with synthetic resins—alkyd, glyceryl phthallate, urea and phenolic types, which dry both by oxidation and polymerization. However, other types may also be infra red baked, such as the oleoresinous. Military finishes, being largely lacquers or synthetics are ideally suited to infra red baking. Above is a list of the most common specifications and their uses, with a comparison of baking cycles.

- 8. Packing with only the surfaces to be hardened exposed; all other surfaces to be packed and clamped into intimate contact.
- Clay, loam and asbestos wrappings.
- 10. High temperature resistant paints and enamels.
- 11. Putty of various composi-
- 12. Mixtures of sodium silicate with clay, calcium hydrate, sand, etc.
- 13. Mixtures of clay and other inert substances.

The purpose of the present work was to attempt to make some comparisons and determine whether or not some of the more modern copper baths would produce deposits which are more effective for selective carburizing than the standard sodium cyanide baths. Also included are some observations made on methods of measuring the thickness of copper deposits.

Panels of cold rolled strip steel were prepared as follows:

Acid copper with cyanide copper strike.

Acid copper with nickel strike.

Bright alkaline copper, No. 1 and

Bright alkaline copper, No. 1 and a very thin cyanide strike.

Cyanide copper (conventional).
Plated with Rochelle salt copper.
Coated with cuprous oxide and
"reduced" cuprous oxide (Electrocolor and Patternplate).

Bright acid copper No. 1 over a cyanide strike.

Bright acid copper No. 2, half of which were plated over a cyanide strike and half over a bright copper strike.

Bright alkaline copper No. 2.

Miscellaneous finishes: "Black Oxide," phosphate, copper-lead and copper-cadmium alloy deposits.

All of the above panels were carburized for from 2 to 24 hr. at 1750 deg. F. The only evidence of penetration of the coatings was traceable to voids in the deposits. In this respect, the Rochelle copper deposits did not show up as well as from the other baths. Copper-lead and copper-cadmium deposits reacted no differently from pure copper from a conventional cyanide bath. Phosphate and black oxide coatings were useless as a means of preventing carburization. was no noticeable difference between the two bright acid coppers in this group and the bright alkaline on the straight cyanide.

Few plated pieces showed serious carbon penetration after carburizing and later hardening in a cyanide bath at 1450 deg. F. The cu-

TABLE II

Types and Thicknesses of Coatings Spray Tested

	Base I	Metal			1	hickness and Coating
Bright	Nicke		0.000			0.00001 in. Cr.
44	46		0.000		+	0.00001 in. Cr.
66	44		0.001		+	0.00001 in. Cr.
64	66		0.000			
60	64		0.000		+	0.00001 in. Cr.
66	44		0.001			
66	44	44		in.		0.00001 in. Cr.
				0.0005		to the manufacture of the
64	44	66			in.	+ 0.00001 in. Cr.
66	44	66	6.6	0.001	in.	
66	46	44	66	0.001	in.	+ 0.00001 n. Cr.

prous oxide and reduced oxide coatings were of the order of 0.00002 to 0.00003 in. thick, and showed some evidence of penetration; particularly one panel which had been given an immersion coat of arsenic prior to plating with the oxide coat.

In no case was the penetration serious enough to cause a marked change in hardness.

Conclusions reached were:

1. The thickness of electrodeposited copper is not a function of its ability to withstand penetration by CO except insofar as thickness is a factor in determining the freedom from porosity.

2. The thickness of copper deposited from an acid bath will have to be greater than from a cyanide or bright bath, to obtain the same protection, due to apparent greater permeability of the acid copper deposit.

3. With factors other than thickness disregarded, bright copper deposits offer little advantage over those obtained from a standard cyanide.

Spray Tests

Salt spray and ocean spray testing were compared in a paper given by C. E. Heussner, Chrysler Corp., Detroit. The purposes of the work described in this paper were:

1. To correlate results of the salt spray test with results obtained in outdoor exposure tests in industrial atmospheres.

2. To correlate results of the ocean spray test with salt spray and industrial atmosphere exposure tests.

- 3. To standardize procedure for salt spray testing, using a large spray room.
- 4. To study the effect of temperature on the results of salt spray testing.
- 5. To study the products of certain nickel baths under these various conditions.

The general procedure was to produce a number of samples by electrodepositing a given type and thickness of coating on steel panels, and then to divide these samples on a random basis, subjecting one group to each type of test used and inspecting periodically for evidence of corrosion. Duration of the test up to initial failure was recorded, as was relative condition of the various groups at the end of the test period. The types and thicknesses of coatings tested are shown in Table II.

Three panels of each type were exposed to each of the following corrosive media:

Roof	exposi	100	9	1	n	-	a	n	ie	10	ł,	99	÷	ri	0	ıl	a	imo	spher	ne.
Oce	an Spro	ıy			. *		*	*	×	×	*	×	×	×		×	*	95	deg.	F.
Oce	an Spra	ıy																72	deg.	F.
Salt	Spray				×	,	*	,		*	*	y			×		×	95	deg.	F.
Salt	Spray							,										72	deg.	F.

In salt spray testing, according to Strasser, Brenner and Dr. Blum, the comparative condition of all panels at the end of a suitable test period is a better measure of value than is a comparison of the time of initial failure. Both methods were applied in this work, with fairly parallel results. Table III gives the overall average times of initial failure for various types and thicknesses of deposit tested, allowing 104 hr. for those groups which went through the test without failure.

As regards time of initial failure, the correlation between salt spray and outdoor exposure is negative. In no case did the chromium plate help to protect the base metal in outdoor tests, and in four out of six cases the addition of chromium plate over the nickel actually reduced the times of initial failure. After termination of the roof test, every chromium plated group showed more base metal corrosion

TABLE III

Comparison of Ocean Spray and Salt Spray Tests

	0.0005 in. Ni	0.0005 in. Ni + Cr	0.001 in. Ni	0.001 in. Ni + Cr	Overall Averag
72 deg. F. Salt Spray	10 hr.	96	40	OK	64
95 deg. F. Salt Spray		72	40	83	54
72 deg. F. Ocean Spray		87	32	OK	61
95 deg. F. Ocean Spray		51	43	43	38
Average	18 hr.	76	29	84	

than the corresponding group having only nickel plate.

Nickel and chromium plated panels showed a greater advantage over plain nickel plated panels in the salt spray than on the roof.

Between salt spray and ocean spray, 20 per cent salt spray is preferable, as its results are less affected by temperature variation.

Factors affecting the life of the deposit in salt spray or exposure testing, are increased thickness of deposit and choice of the proper nickel bath.

Bright Copper Plating

The use of bright nickel has done much to relieve the high cost of preparing electroplated deposits for receiving chromium, but it requires a bright undercoat such as copper. The use of buffing to obtain a bright finish on copper is wasteful of metal, removing as much as 0.0003 in. from an 0.001 in. deposit, or over 30 per cent. To the General Motors Corp. this meant 625 tons of metal per year. Hence this search for a suitable brightener.

A standard bath was decided on, containing:

CuSO.		×			×		×	,	*	×		25	50	grams per liter
H2SO													10	grams per liter
Temper	a	h	11	e										70°-80° F.

It was found that small additions of thiourea to the solution exerted a marked brightening effect on the deposit; as good as any of a large number of organic and inorganic compounds tested.

The optimum amount was found to be 0.04 grams per liter. It can be controlled. A secondary addition agent, a "Range Increaser" made possible plating of uniform brightness over a wider range of current densities and also prevented pitting and streaking. Of the organic, commercial active materials and some inorganic salts tested in the standard bath containing thiourea, the simple, one-ring aromatic sulphonic acids were most effective.

A semi-bright plate was found useful to cover imperfections in the basis steel, and then brought to a high luster with a light buffing or "wipe." A typical bath of this type contains:

Copper sulphate250 grams per liter
Sulphonic acid10 grams per liter
Triton No. 720 (a salt of
a sulphonated selection)

Cathode movement or air agitation is recommended.

No methods of analysis for thi-

ourea or Triton have been found; the addition agents are satisfactorily controlled by inspection of the deposit. Their presence does not interfere with regular control methods of analysis. Above 80 deg. F. the brightness decreases and at 120 deg. it is lost. Excess thiourea may be nullified by the addition of hydrogen peroxide, in carefully determined quantities.

At 55 deg. F. deposits were uniformly bright and the wetting agent Triton No. 720, could be omitted; also the amount of thiourea used is less critical.

Molasses is also an excellent secondary addition agent.

There is undoubtedly a decomposition product formed in the bath, and when it has accumulated to a point where it destroys the brightness of the plate and further additions of thiourea do no good, the bath may be purified by filtration with a good filter aid.

Another semibright bath in operation consists of:

Copper s	ulphate				210 grams per liter
Sulphuric	acid .			,	30 grams per lite
Molasses		 			0.80 grams per lite
Thiourea					0.04 grams per lite
Temperat	ure			+	70 deg. F
					-75 amps. per sq. ft

Plating can be carried on for over 1000 ampere-hr. without additions of thiourea.

A cyanide copper strike is necessary when plating on steel parts.

Iron as an impurity does not affect the luster.

The authors also included a description of the grain size and crystal structure of the deposits obtained, as determined by the x-ray.

The authors of this paper, F. L. Clifton, and W. M. Phillips, General Motors Corp., Detroit, stated that General Motors Corp. offers to license this process free for the duration of the war and the following six months, to those in a position to use it.

The anodic treatment of aluminum by the chromic acid process was discussed by L. G. Tubbs, Mutual Chemical Co. of America, New York. Anodizing is used for providing a protective coating on aluminum and to provide a surface to which paint will have satisfactory adherence. It is performed by using the work to be treated as an anode in a 5 per cent to 10 per cent chromic acid solution, thus producing a film on the surface of almost pure Al₂O₃. The tank which acts as the cathode, may be of steel; temperature of solution, 95 deg. F. A low voltage direct current is applied at the start, then increased to 40 volts as rapidly as possible without burning the work or overloading the generator, and held at that voltage for about 30 min.

Thickness of deposit of the anodic film is almost directly proportional to the amp.-hr. per sq. ft. Current densities may vary from 1 to 3 amp. per sq. ft. A satisfactory deposit should resist a 20 per cent salt spray for 250 hr. at 95 deg. F., which ordinarily would call for 0.00002 in.

The effective area of the cathode need not exceed 5 per cent of the surface of the aluminum. For purposes of estimate it may be figured that for every 2 gal. of tank capacity there should be provided about 1 amp. generator capacity. A tank holding 3000 gal. will anodize from 200 to 800 sq. ft. of aluminum at one time, depending upon the type of work.

Aircraft Metal Finishing

An analysis of the materials used in all airplanes made for the United States Army Air Forces in 1940 reveals the following weight percentages:

	Per Cent
Aluminum alloys	68.5
Ferrous alloys	
Wood	4.5
Magnesium	2.0
Miscellaneous	
(including copper, nickel and the	eir

This information was made available in a paper presented by E. R. Irwin, and Lt. J. Teres, Air Corps, Wright Field, Dayton, Ohio, who pointed out that almost all aluminum is treated, either for corrosion resistance or for pretreatment before painting for camouflage. The most common treatments are anodizing, chromadizing, phosphating, alkaline chromate and silicate processes. Of these, only anodizing improves corrosion resistance materially without paint.

Precleaning to remove mill oil is removed by vapor degreasing and/or an inhibited alkaline wash. There are a number of satisfactory commercial alkaline cleaners based on silicates, phosphates, soaps or their combinations.

A cleaner developed by the Army Air Forces consists of:

Trisodium phosphate Di-sodium phosphate	
Sodium metasilicate	
Sodium carbonate (anhydrous)	6 lb.
Soft soap	
Water	100 gal.
Temperature	210-212 deg. F.
	ON PAGE 123)



Peg Allen's new coffee maker is helping to bring down Stukas

"I'm rushing down right now to huy another Defense Bond and get even with Hitler and the Japs! I just found out I can't get the automatic coffee maker that I've been dying to have, because the manufacturers of household appliances are making nothing but munitions. So the coffee maker and the money I'd saved will both be helping to win the war!"

Nowhere else on earth have household electrical appliances been so numerous, so ingenious, so inexpensive as in America. When the manufacturers in this great industry turned all their resources to building munitions, they struck a heavy blow against the Axis.

But a conversion as drastic as theirs posed some knotty problems. New

designs and specifications required many new alloys, tools and methods. In cooperation with the Revere Technical Advisory staff, a number of the leading appliance manufacturers were able to change over with gratifying speed and ease. For Revere supplies industry not only with sound copper alloys, but also with a highly experienced service in the most efficient methods of using them.

Today, every ounce of copper goes directly into the essentials of modern warfare. There is none for any other use. Fortunately Revere was prepared, with new plants, advanced processes, improved equipment, to assume an important responsibility in the production of our nation's vital copper alloys. And additional facilities are steadily being added to help make victory still surer and quicker.

REVERE COPPER AND BRASS INCORPORATED

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK



The Revere Technical Advisory Service functions in (1) developing new and better Revere materials to meet active or anticipated demands; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; (3) continuously observing developments of science and engineering for their utilization in production methods and equipment; (4) helping industrial executives make use of data thus developed. This service is available to you, free.

Assembly Line

• CIO pickets oppose model change at aircraft plant . . One plane engine plant producing at 117 per cent of schedule . . . Silver bearings forecast for post-war automobiles.



ETROIT-Even before last week's remarks about model change-overs in Detroit war industries had reached print, one of the CIO unions was protesting about the lay-off of workers that is accompanying some of the model changes. As a result, information which the armed forces would have probably kept quiet was given a public airing instead. Massed pickets patrolling around the Detroit plant of the Murray Corp. of America proclaimed that they were being laid off while the plant slowed production on one type of aircraft and tooled to produce another type.

The picketing took the form of a protest only, not a strike, and served no purpose more important than that of satisfying union members that its leaders were "on their toes"—this time to the extent of heckling the management, nothing else

The management simply announced that the layoffs and projected layoffs are "essentially the same as a model change" layoff period. "We have had changes in automobiles for years," the firm's statement said, "and hence a similar situation is to be expected in aircraft production because of the demands of a changing military situation."

As stated here last week, the tooling program will be completed in early fall; production on current types of planes is tapering off now, with a cessation of output on these

particular models due before the actual change-over takes place.

There will be other model changeovers during the war program and the CIO is setting an ugly pace for itself if these "protests" are to be continued every time a plant prepares for a change-over. In this instance, the union grossly exaggerated the number of men displaced (employment figures are taboo under censorship) and made broad accusations that the firm hadn't planned to undertake enough war work to offset lack of employment. As a matter of record Murray has multiplied its employment many times in the past year, taking on thousands of outsiders in addition to swinging all of its automotive workers into war work without Since the Murray war layoffs. work contracts called for a great expansion in personnel, the firm was able to start hiring at an early date outside its own seniority lists. Now, simply because the company was one of the first to start on an airplane manufacturing contract, it is one of the first to complete an undertaking and begin to tool on new contracts.

Briggs Mfg. Co. is also completing some of its original contracts and will fill up capacity thus made available by undertaking new contracts as soon as tooling is completed.

Visit to one of the first firms to undertake aircraft engine production in this area reveals that it is consistently hitting a production level far above schedule. The figures show, for instance, that this particular plant in May had an output equivalent to 117 per cent of its schedule. This is a fairly typical sampling among the firms which were in the war program early enough so their tooling is completed and mass production is an accomplished fact.

In this plant were discovered some interesting figures on the cost of perishable and semi-perishable tools used in aircraft engine production. On the basis of 1000 engines a month, an expenditure of about \$900,000 for such tools could be anticipated, available figures indicate. Actually, the tool cost is running today between \$800 and \$1200 per engine. This helps to bring to the front the question

"how can we get enough cutting tools to run such programs?" Even though the cutting tool industry this year will turn out about four times as many tools as it did in 1939, it is doubtful if it will be able at all times to keep up with demands such as those in this aircraft engine plant.

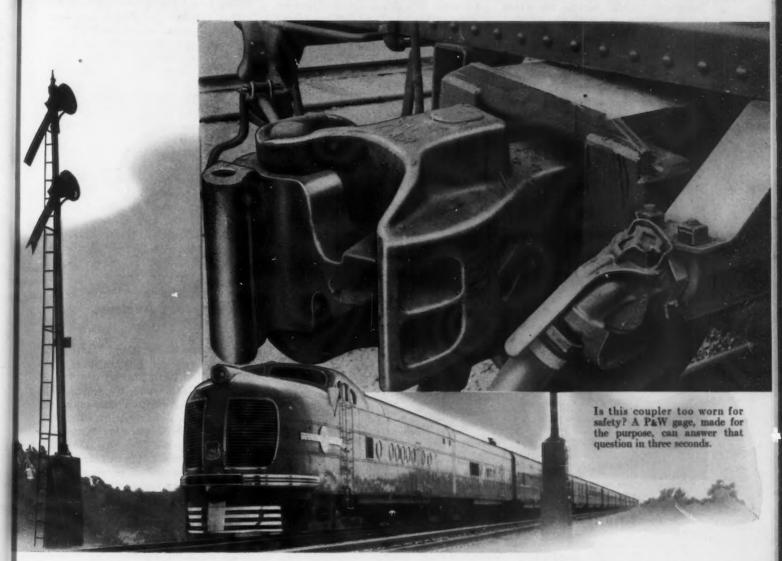
One of the solutions, of course, is the use of standard tools, instead of special tools. But this aircraft engine plant has another solution. It is setting up a special tool room with about 150 men to make the tools on which delivery is extremely difficult. This tool room will engage in small lot production only, to meet emergencies.

One of the leading independent manufacturers in the industry last week made an off-the-record prediction on post-war automobile designs. He said that the biggest single technical advance predictable now, on the basis of wartime experience, is that the automobile will make general use of silver bearings, replacing the present-day babbitt metals. Silver bearings stand up better than present materials and can be loaded up 50 per cent more. This will mean narrower bearings and smaller diameters, probably leading to further conclusion that engines will be more compact.

General use of aluminum in automobile engines, chassis and bodies is not likely, according to this manufacturer. He points out that the fatigue factor of aluminum is a poor one and that stiffness of aluminum is not great enough to permit designers to take full advantage of the low weight of the material. Asked about the use of steel sleeves in aluminum engine blocks, he warned that such an engine would be too noisy. Cast iron, now used in engine blocks, has a pretty good value as a noise absorber. Declaring that no one knows yet how to weld aluminum easily on a production basis, this production man added that welded aluminum units in automobile bodies would not be 100 per cent satisfactory unless it was possible to weld the aluminum to steel, taking advantage of both materials in a composite structure.

There is a lot of current chatter about light-weight automobiles but "how light can an automobile be?" is an unanswered question. If the

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This gage shows how much metal must be removed to restore the original wheel contour, and how much service metal will be left.

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If you were going to create a railroad . . . build your own locomotives, cars, signal systems, and all the rest . . . about the first source of supply you'd seek out would be Pratt & Whitney. One way or another, you'd need almost the whole wide range of P&W products. Our big, super-accurate Keller machines, jig borers, lathes, shapers, and grinders go into many phases of locomotive and rolling stock manufacture. Our cutting tools — many like staybolt taps, bridge reamers, mud taps, milling cutters — are made expressly for railroads — used in both manufacturing and maintenance. Our gages serve all along the line . . . right from building to accurate standards to checking wheels and couplers in service.

P&W accuracy keeps 'em rolling longer, faster, safer. Our engineers have long worked closely with the Association of American Railroads—tough customers who won't even look at anything but the best. They talk our language—they recognize the value of accuracy. They're vital to Victory... we'll help them do their part.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD . CONNECTICUT

American public insists on autos comparable in size to those of today (and that seems likely) the cars will obviously have the same side area and a tendency to be pushed around by side winds that no designer has yet licked. The most accurate answer to the question of light weight could be obtained by building a sample car of aluminum and magnesium to current automobile dimensions, and trying it

contract schedules being increased frequently, and new orders piling on top of old, Packard is about 60 per cent "home" on its war program. Eighty-one per cent of its plant space is dedicated to war work and 19 per cent is still retained for peacetime auto parts manufacture and machinery storage. The Rolls Royce engine requires about 80,000 machine operations on its 11,000 parts. (The 1942

AUTO EQUIPMENT CONVERSION: This Newton, four-head milling machine, formerly used in making automobile cylinder heads at Pontiac, is now being used to face castings for diesel fly-wheel housings.

out on the road. It would cost about \$35,000 for such a sample car, this production man said, "I'm not that interested (\$35,000 worth) in finding out."

H E characterized the current automobile as a high-carbon, high-manganese steel vehicle and declared that there is a chance to improve the cars by the wide-spread use of electric alloys when they are produced in large volume at low cost after the war.

Packard takes special guests through its Rolls Royce and marine engine divisions on a Toonerville Trolley consisting of plant trucks (industrial donkeys) and a string of trailers with chairs mounted on them. On such a tour with Packard officials last week it was learned that Packard's dollar volume of shipments in May was twice as great as any month's shipments of automobiles has ever been. With

Packard Clipper sedan had only 7140 parts in the entire car.)

Illustrative of the fact that product design and much-talked-of plant conversion are directly related is found in a comparison of the tooling on the Rolls Royce and the marine engine. The English-designed Rolls Royce was such that it required all new machinery, and about 3400 new machines were installed. On the other hand, the marine engine design was such that Packard could convert its automaking machines in the ratio of three old to every two new machines bought. On the Rolls Royce, the upper crankcase presented some pretty problems: Machining necessitated 138 operations on 77 new machines.

Prominent in the Packard plant are evidences of the WORK TO WIN program instituted recently by special committees representing both management and labor. Information booths and banners that are either citations or 8-ball pennants, depending upon departmental progress, are seen throughout the plant. In the first month of operation the plan produced 900 suggestions from workers, many of them contributing to cost reduction. As a matter of fact, cost reductions achieved in May totaled about 20 per cent higher than in April, before employee co-operation was obtained. George Christopher, Packard president, is immensely pleased with the success of the program. His prescription for successful cooperation with the Packard union is summed up in these words to management executives "Don't try to run the union."

Juke Box Maker to Build Plywood Airplanes

Chicago

• • • Plans to construct small plywood planes and gliders in a new plant to be built shortly were announced last week by the Mills Novelty Co., ex-juke box makers. The company has acquired a license from the Langley Aviation Corp. of New York to use the Langley process for making aircraft components of plywood.

The company expects to undertake an educational order first, to obtain operating experience. This order will probably involve the manufacture of plywood parts such as ailerons and tail structures.

The company previously made various types of coin operated vending and amusement machines. Production of this equipment, however, has been stopped by WPB regulation, leaving the company with substantial stocks of veneer and a large wood working plant on its hands. The company reports that it has most of the equipment needed to convert to plane production already on hand.

Non-Absentees at Bullard Get 10 Per Cent Wage Boost

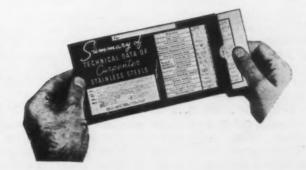
• • • • Bullard Co., machine tool builder, Bridgeport, Conn., will distribute approximately \$30,000 worth of war savings stamps weekly among its employees as a reward for prompt, and regular attendance. As a double reward, those winning stamps will be eligible for a weekly drawing for bonds valued at \$950.



- Which Stainless is best for WELDING?
- Can it be HARDENED?
- Which Stainless is EASIEST TO MACHINE?
- What about high HEAT RESISTANCE?
- What ANNEALING TEMPERATURE is best?

The answers to those questions and others are provided at a glance by the Carpenter Stainless Selector Slide Chart. This Slide Chart gives you a handy way to check your fabricating or processing requirements against the properties of Stainless Steel. Thousands of these quick-reference Carpenter Slide Charts are now at work in war plants and Design Departments—making it easier to select and use Stainless Steel. Write on your company letterhead for this Slide Chart today. It is free to users of Stainless Steel in the U. S. A.

Part of Carpenter's job during TOTAL WAR is to help industry get it out faster. Ask for information on other Carpenter helps that are doing that job now. Consult your Carpenter representative about your problems. Get the benefit of his wide experience in fabricating Stainless Steel.



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Carpenter STAINLESS STEELS

Washington . . .

• Congress seen forced into self defense because of its own blunders... Gasoline card favoritism, lashing of Henderson for non-cooperation in price set-up draws more criticism.



TASHINGTON - Mounting criticism of Congress has roused the national legislators to a high pitch. From the floors of the Senate and the House and from public platforms they are striking back forcefully at critics. A common charge is that made by Speaker Sam Rayburn that there is "a studied effort to destroy faith and confidence of the American people in their elected representatives." Mr. Rayburn, ordinarily a level-headed man, delivered himself of this unusual outburst at the recent Muhlenburg College bicentennial at Allentown, Pa. He was "defending" Congress. His excessive irritation reflected a collective feeling in both branches of Congress. It permeates practically all members alike, regardless of partisan affiliation. They close ranks and go in for unity when widespread criticism is directed to them.

THEY blast at the press generally, commentators, speakers and writers for spreading propaganda and affect to be horrified that it may wreck the constitutional form of government.

The fact is that the criticism of Congress comes from a cross section of the public. Most if not all members of Congress are acutely conscious of that fact. But they are not going to commit the polit-

ical faux pas of scolding their constituency. Instead they adopt a sort of oblique strategy and seek to defend themselves by striking at criticism by the press, commentators and public speakers.

HE disturbing thing about this flare-up in Congress is that it finds it necessary to "defend" itself. It has done the same thing in the past and once the flurry was over it became only a memory. But bitter public criticism as reflected in the press news columns, "letters to editors" and letters direct from constituents rose to a great volume recently. It had the aspect of a wave that had been gathering force and reached its crest when Congress blundered into immunizing itself from gas rationing. Whatever may be the merits of "X" cards for the national legislators, the public resented the fact that while it is being called upon to make sacrifices, which are to become much greater. Congress itself refused to forego its own conveniences in behalf of the war effort.

ITS performance provoked the public to venting its anger that has been aroused to an unusual degree the past 10 years, when Congress, with certain notable exceptions, has been a rather consistent robot for the Executive Branch. So it wasn't just the X-card deal that the public was riled about. The deal gave it a chance to open the valve and let off steam and there are members of Congress who think the public did a good and necessary job.

Shortly before it had done the same thing respecting the pension plan and so effective was the criticism that an alarmed Congress faced about quickly and revoked its vote for pensions. There definitely is a good argument for pensions for members of Congress. And, as is often the case, Congress came in for unfair blasting for voting itself pensions, just as ranting demagogues in Congress so often blast industry and the "economic royalists" generally without at all discriminating between those who may and who may not deserve to be attacked. It was the timing perhaps more than anything else



WAR INFORMATION HEAD: Elmer Davis, radio news commentator, had no comment to make on his appointment as head of the Office of War Information, which will consolidate several government information bureaus.

that brought the wrath of the public on the heads of Congress for seeking to put itself on the pension payroll. It was as if the public was declaring that if it is to make sacrifices Congress shall not insulate itself and escape doing its part.

THE spectacle of Congress having to rise to self-defense was due to its own blunders. Rather than a threat to constitutional government, the aim of the criticism was to preserve that form of government. Talk of concerted effort to undermine faith in Congress is either the child of ignorance or it was prompted by political jitters of members who are about to go on the hustings in an effort to keep themselves in office. The criticism



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As steel furnaces continue to operate at or near capacity, refractories are subjected to greater strain and faster wear. Thus good refractories, properly applied, are increasingly important to the steady, efficient production of open hearth and electric furnace steel.

To the men who operate the furnaces-men successful in meeting production problems with ability and judgment-we offer the assistance of a staff of trained engineers, capable men to service good refractories.

Basic Field Engineers are, first of all, experienced steel men. From years of work with the open hearth they know the practical side of steel making. They also know refractories. Their specialized training and knowledge enable them to tell how refractories will act under variable conditions.

You, as a busy open hearth or electric furnace operator, can confidently rely on the Basic Engineer as your refractories service man. His job is to supervise and assist with the installation of new hearths, major repairs and special applications. In fact, there may be numerous situations on which he may be able to advise you so as to reduce delay time and lower refractory costs.

Call upon this Basic Engineer whenever you have a refractory job to do. He is anxious to help you get maximum production out of your furnaces.

MAGNEFER-Dead-burned dolo-mite for hearth and slag line

SYNDOLAG - Dead · burned, rice size dolomite for maintenance.

size dolomite for maintenance.

BASIFRIT—Quick-setting magnesia refractory for new construction, resurfacing and maintenance.

OHIO MAGNESITE—Domestic deadburned high-magnesia grain refractory, equal to Austrian.

695 PLASTIC-Strong plastic basic refractory for hot and cold repairs.

RAMIX—An air-setting, time-saving basic refractory for rammed hearths and cold repairs in open hearth and electric furnaces.

GUNMIX-A basic refractory with chemical bond, sized for use with a cement gun.

HEARTH PATCH—For deep hole patching and other quick repairs in the basic open hearth. RAW DOLOMITE—Washed open hearth dolomite in rice size and standard 5-inch.



BASIC REFRACTORIES INCORPORAT

FORMERLY BASIC DOLOMITE, INC.

CLEVELAND, OHIO

in effect told Congress to rise to the dignity it was given by the Constitution, a co-ordinate and not a subordinate branch of government. For unless it does assume that rank, rather than acting as a rubber stamp for the Executive Branch, constitutional government will be only a memory. In its place will be the ugly totalitarianism which this country now is fighting and in doing so it is faced with the most grim task in its history.

It is for Congress to justify public confidence. That done it need not worry about faith in Congress. Its ineptitude, however, is amazing and makes faith-building a difficult job. Hardly had members ranted about press criticism than some holier-than-thou New Dealers in Congress, their patronage hunger insatiable, gave Price Administrator Leon Henderson a bitter verbal lashing because he did not let them in on selecting state and regional price administrators. Which is not to say that the selections left nothing to be desired.

Unless and until Congress performs its responsibility it and not the public will undermine faith in itself and promote destruction of constitutional government.

Army Wood Truck Bodies to Save 275,000 Tons of Steel

Washington

• • • The Army's new policy of prescribing wood bodies instead of steel on all cargo body trucks of 1½-ton size and larger is expected to conserve approximately 275,000 tons of steel, according to the Office of the Quartermaster General. It was pointed out that the conversion is merely one of many being made to save every possible pound of critical material—rubber, steel, nickel, copper and aluminum, particularly — without loss of quality or military efficiency.

In connection with scrap salvaging operations, the Army announced that they are being intensified through coordination with war production agencies. Officers in charge of the Army salvaging work will have expert advice from WPB regarding methods of collection, segregation and classification of salvaged materials, and timely information on current needs and scrap prices.

To facilitate such service, WPB's Bureau of Industrial Conservation is establishing regional advisory offices which will be available to all corps area commanders and supply service chiefs. The Salvage Section, Service of Supply, will be in charge of all salvage operations that involve more than one military agency.

The program to convert truck bodies to wood construction was explained in detail at a recent meeting in Washington of all prime motor vehicle contractors and more than 300 prospective wood body builders. Complete specifications and blueprints were furnished for the five sizes of bodies required. Details of the conversion schedule—50 per cent by Aug. 1 and 100 per cent by Sept. 1, also were presented.

Prime contractors were instructed to spread their wood body subcontracts as widely as possible and to advise all interested body builders with production facilities to ask the Motor Transport Service of the Office of the Quartermaster General for blueprints, specifications and complete details.

House Magazine Discusses Cleaning of Gun Barrels

• • • Cleaning machine guns and automatic cannon after proof firing is the subject of an article appearing in the May-June issue of Oakite News Service, bi-monthly house magazine of Oakite Products, Inc., New York.

In discussing a new method for handling this work on a volume basis at a speed in keeping with production requirements, the article points out that this improved cleaning technique eliminates not only the necessity of oiling the gun barrels, but also rusting difficulties during final assembly and inspection.

Another article of timely interest is that entitled "How to Prolong the Life of Rubber."

Armored Forces Insignia Given

• • • A new award for outstanding achievement in war production was inaugurated recently at Belleville, N. J., when Maj. Sedgley Thornbury, of Fort Knox, presented Walter Kidde & Co. with the Insignia of the Armored Forces. The occasion was a war production rally staged by the Kidde Labor-Management Committee to celebrate the fact that production for the first six and one-half months of 1942 was greater than the total output in 1941.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



War Department Announces New Building Projects

Washington

The War Department announces

1. Authorization for construction of a General Hospital at Swannanoa, N. C., to cost in excess of \$3,000,000. Construction will be supervised by the Nashville, Tenn., district office of the Corps of Engi-

Tenn., district office of the Corps of Engineers.

2. Award of a contract to Ford, Bacon & Davis, Inc. of New York, N. Y., for architectural-engineering and consultant services, in connection with a manufacturing plant in Indiana, to cost in excess of \$3,000,000. Construction will be supervised by the Louisville, Ken., district office of the Corps of Engineers.

3. Award of a contract to Mauran, Russell, Crowell and Mullgardt of St. Louis, Mo., and Giffels & Wallet, Inc., of Detroit, Mich., for agricultural-engineering services, in connection with the expansion of a manufacturing plant in Missouri, to cost in excess of \$3,000,000. Construction will be supervised by the St. Louis, Mo., district office of the Corps of Engineers.

Louis, Mo., district office of the Corps of Engineers.

4. Award of a contract to Wilson & Co., Salina, Kan., for architectural-engineering services, in connection with a depot warehouse in Colorado, to cost in excess of \$3,000,000. Construction will be supervised by the Albuquerque, N. M., district office of the Corps of Engineers.

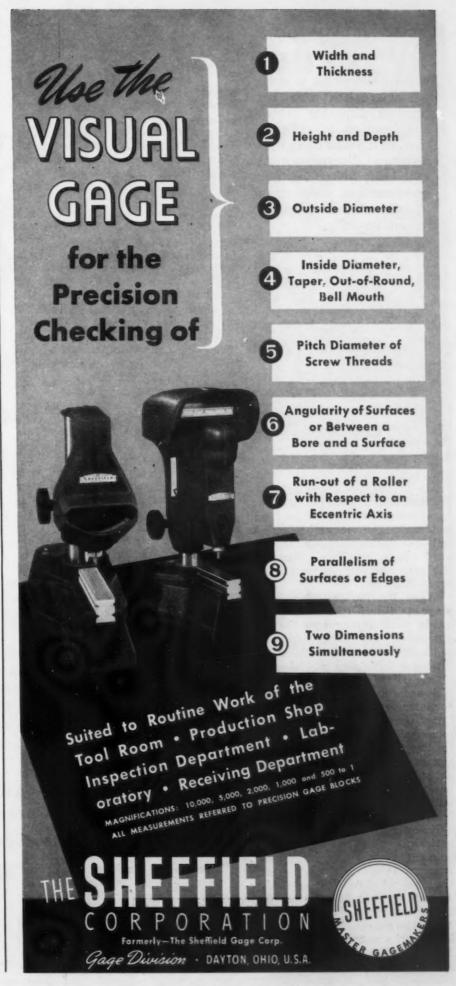
5. Award of a contract to E. B. Van Keuren and J. W. Goodwin, Birmingham, Ala., for architectural-engineering services, in connection with the Air Force Training School at Courtland, Ala., to cost in excess of \$3,000,000. Construction will be supervised by the Nashville, Tenn., district office of the Corps of Engineers.

6. Award of a lump-sum construction contract to the J. A. Jones Construction contract to the J. A. Jones Construction Co., Charlotte, N. C., in connection with the Air Force Training School at Gulfport, Miss., to cost in excess of \$3,000,000. Construction will be supervised by the Mobile, Ala., district office of the Corps of Engineers.

A.S.M.E. Nominates Officers for 1943

• • • At the semi-annual meeting of the A.S.M.E., held in Cleveland June 8-10, the following men were nominated for 1943 officers:

For president, Harold V. Coes, vice-president, Ford, Bacon & Davis, New York; for vice-presidents, J. W. Eshelman, president, Eshelman & Potter, Birmingham; T. E. Purcell, general superintendent of power stations, Duquesne Light Co., Pittsburgh; G. T. Shoemaker, vice-president, Kansas City Light & Power Co., Kansas City; and W. J. Wohlenberg, professor of mechanical engineering, Yale University, New Haven. The following were nominated for managers: R. W. Morton, professor and head of the department of mechanical engineering, University of Tennessee, Knoxville; A. E. White, director of engineering research, University of Michigan, Ann Arbor; and A. R. Stevenson, staff assistant to vice-president, General Electric Co., Schenectady. Election will be held by letter ballot, closing on Sept. 22, 1942.



WEST COAST.

· Pacific area plane plants likely to be guinea pigs for wage stabilization . . . Small tool manufacturers charge discrimination by Army, Navy, other government agencies ... Coast war industry grows rapidly.



CAN FRANCISCO — Pacific Coast aircraft plants probably will be guinea pigs for wage stabilization throughout the industry with the full blessing of the WPB labor division. Paul R. Porter, government representative who guided negotiations leading to nation-wide stabilization of shipyard wages, has been assigned to the corresponding job in the aircraft industry.

When Mr. Porter took over the wage stabilization job for the shipyards, over a year ago, the first agreement negotiated under his guidance set wages, working conditions and training provisions for nearly all West Coast shipyards. This agreement served as the model for later agreements covering East Coast, Great Lakes, and Gulf yards, and finally culminated last month in the Chicago agreement which equalized shipyard wages throughout the country. The same pattern has been cut out for the aircraft builders, at least on a regional basis.

Following weeks of informal negotiations, which have increasingly pointed to such a program, labor, government, and plant representatives are scheduled to meet in Los Angeles early in July for the first official conference. Whether or not Midwestern and Eastern airplane builders choose to recognize it, both AFL and CIO representatives are plugging hard for a nationwide wage net. Their first objective will be to bring Coast wages up to those paid by the automotive plane build-That does not particularly concern the plants already following this scale. The second objective, not yet unveiled, is insertion of a contract clause tieing wage rates to cost of living indices. That concerns everybody.

These negotiations will differ from the shipyard parleys and from nearly every wage conference previously conducted in a particular which is important to the entire anti-inflation program-both labor and management will be agreeable to a sharp wage boost. The only possible restraining influence will be the representatives of the labor division of WPB.

How much restraint can be expected from the labor division? Certainly more than when Sidney Hillman was at the helm. One of the first holes to appear in Hillman's dike of personal prestige after he took the job appeared when he fled the West Coast rather than take a stand of any sort in shipvard disputes following the first wage-hour stabilization agreement last year. Later last year he failed to use his influence to bring about stability in the Southern California aircraft industry, and the later wage agreement among the eight principal plane manufacturers in that region was concluded in spite of, rather than because of, him.

Porter, on the other hand, has a record of positive action in his handling of the shipbuilding stabilization conferences. Although his position as government representative carries with it the responsibility for mediation between labor and management he brought forth from the shipbuilding meetings agreements which reflect strongly government policy. He won acceptance of the principle that overtime pay should be allotted on the basis of the number of days worked during the week rather than whether the work happened to be done on Saturday or Sunday. Out of the recent Chicago meeting on shipyard wage stabilization nationally, conducted by Porter, came an agreement in which West Coast unions accepted a wage raise substantially smaller than that which would have become effective automatically under cost - of - living clauses in the expiring contract.

HE Chicago agreement did, however, embody the principle of like pay for like work all over the country-even in the South. If that was precedent, an aircraft industry agreement might well raise West Coast wages to Eastern levels -inst what the unions are asking. Also to be remembered is that President Roosevelts' admonition to "stabilize" wages presumably went only to the War Labor Board as an arbitration policy-not to the labor division of the War Production Board, which is not going to arbitrate this matter.

If the government really wants to keep the screws down on wages, Porter should be able to do it. It may have been just accident, but the Roosevelt speech advocating wage "stabilization" came just on the eve of the Chicago shipbuilding meeting. His message to the meeting opposed the full projected increase. And it was clear that somebody threw the fear of heaven into labor delegates that if they didn't accept a moderate agreement, a torrent of governmental wrath would be loosed upon them. If Porter can handle the aircraft stabilization meetings to such mutual satisfaction as he handled the shipbuilding meetings, he will definitely become the fair-haired labor diplomat in the government organization and a candidate for still more responsible posts.

What are the actual prospects for aircraft wage stabilization? For a regional West Coast agreement they amount to almost a sure thing. Increased wages? Yes, but the edge will probably be taken off the increases by provision that at least a portion be in the form of war Who will pay the bill? bonds. Uncle Sam, because he is the principal purchaser of airplanes.

Until some stabilization is accomplished among the major aircraft builders, parts suppliers and sub-contractors are feeling the backwash of uncertainty. The Aircraft Parts Manufacturers Association, whose members are located in Southern California, has asked exemption from any OPA price ceiling on the grounds that "labor comprises a major portion of our



• Pearl Harbor-Manila-Wake-Singapore-Java-Bataan-Corregidor-Burma!

Are you using all your ingenuity and resources to turn this tide?

Are you using advancements such as Speedy TOCCO to multiply output of armament so that our boys can really put the heat on Tokyo and all Axisland?

Standard TOCCO Induction Heat Treating equipment is speeding production of the war material listed here. Other applications are being developed daily.

Consult us today on these or the many other applications of TOCCO Induction Heat Treating.

A STANDARD UNIT. TOCCO can be adapted to post-war jobs by simply changing the work fixture. Application shown is brazing of shell adapters.

TOCCO Induction Heat Treating Speeds Production of . . .

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Crankshafts Camshafts **Armor Piercing Shot Tank Sprockets** Track Pins **Grouser Shoes Propeller Hubs Bar Stock**

ANNEALED

Cartridge Cases Aviation Tubing

BRAZED

Shell Adapters Incendiary Bombs Burster Tubes Fuse Seat Liners Mortar Shells

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Cartridge Cases Shells Bombs **Gun Barrels Propeller Hubs Aircraft Screws**

THE OHIO CRANKSHAFT COMPANY Cleveland, Ohio

SPERM ELECTRIC HEAT IS GENERATED WITHIN M ELECTION TO BE HEAT-TREATED





costs, amounting in many cases to more than 70 per cent of the contract price."

A wire by the Association to Leon Henderson, Donald M. Nelson, Merrill C. Meigs, and Harold E. Talbott also sets forth that "unlike other commodities on which price seilings are imposed, we have no variables except the profit item. We cannot change color or style of our products, substitute materials, or profit by unique design, advertising, or other factors entering into sales. We are bound by specifications handed us for manufacture of essential war products. Our industry, therefore, has no dealings with the public and no significant part in inflation.

"Labor representatives are demanding large wage increases, which apparently are inevitable. Work has been of highly specialized and experimental nature. . . We suggest permanent exemption of aircraft parts processing industry be given careful consideration and that at least effective order placing price limitation on this industry be deferred until stabilization or wage freezing is accomplished and that prices be predicated upon such established labor rates. . ."

Small Southern California tool manufacturers last week echoed previous charges of other suppliers in that region that the Army, Navy and other government agencies are discriminating against them. These manufacturers' complaints must be differentiated from those of small shops which are incapable of meeting either financial, production, or engineering specifications. Since the United States entered the war, the

complaint runs, the government has balked at awarding contracts which would provide completely integrated production of any vital product within the war zone.

PROTEST was loudest when plans to build a colony of integrated aluminum plants were dropped. Then came shrieks from aircraft sub-contractors that they had idle capacity because contracts were being channeled east of the Rockies by government direction. Now comes the charge of discrimination by the small tool manufacturers.

When enemy conquest is a possibility, the wisdom of diffusing production is unquestioned. In the case of the West Coast, however, another factor must be weighed against this possibility. The small tool manufacturers point out that effective sabotage against transportation facilities from the East could cause coast plants to shut down rapidly for lack of tool and parts replacements. The same would be true of finishing and assembly plants were the flow of semi-processed materials and sub-assemblies interrupted.

Despite these relatively minor complaints war industry continues to grow at a rate faster than in any other part of the country. Out of an estimated 56 billion dollars in war contracts awarded from June, 1940, through March, 1942, California had more than any other state, nearly $5\frac{1}{2}$ billion, and Washington ranked seventh with over 2 billion. During May, 1942, the WPB bureau of finance reported that it had assisted manufacturers in war production to obtain loans

aggregating \$54,476,358. Nearly one-seventh of this total, \$7,156,-850, went to 68 California manufacturers. Thus, California's participation seems to be increasing rather than dwindling.

Pouring of concrete in Friant Dam, on the San Joaquin River, near Fresno Cal., was completed last week. Friant, fourth largest concrete structure in the world, will be one of the last dams for purely flood control and irrigation purposes to be completed by the Bureau of Reclamation until after the war. Some work still remains until the structure can be regarded as finished, however.

Pig Iron Coke Capacity Lifted in Chicago Area

Chicago

• • • Further expansion of pig iron and coke making capacity of the Chicago area was announced last week. This expansion, involving projects at the Gary works of Carnegie-Illinois Steel Corp. and the South Chicago plant of Interlake Iron Corp. will increase the district's coke making capacity by 400,000 tons annually and pig iron output by 100,000 tons a year.

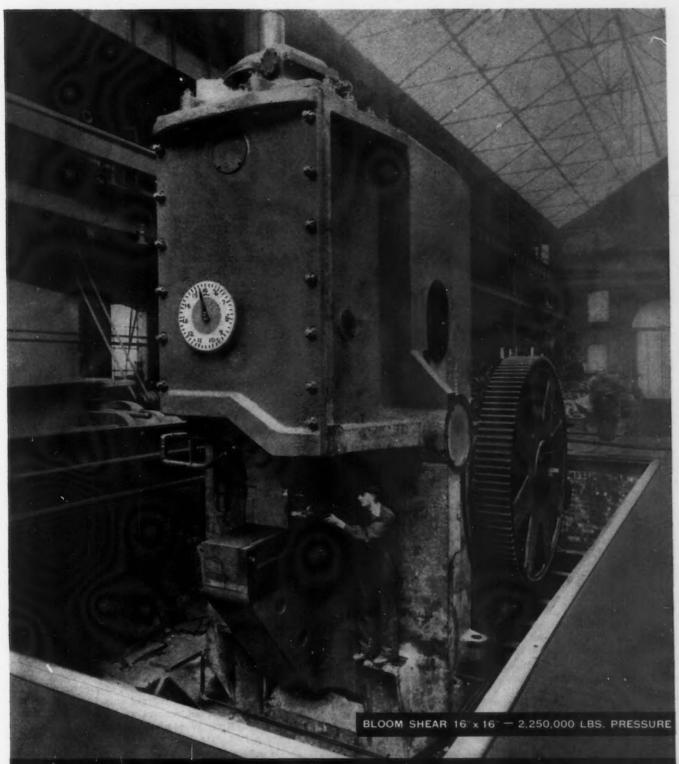
Carnegie-Illinois will begin construction shortly on a new battery of coke ovens adjacent to the coke plant at the Gary works, estimated unofficially to cost about \$5,000,000. The ovens, which will have a capacity of 400,000 tons a year, are expected to be completed and in operation in about a year. Carnegie is acting for the Defense Plant Corp., an RFC subsidiary, in the building of the ovens and upon their completion they will be leased and operated by the steel company.

Interlake has relined and enlarged one of its two South Chicago blast furnaces and has scheduled alterations to the second unit. In addition it is planned to install a sintering plant. When this program is completed, pig iron capacity at Interlake's South Chicago works will be increased 100,000 net tons a year. The first relined and enlarged furnace was lighted last week.

In addition to the South Chicago expansion, Interlake is expanding pig iron capacity at its Toledo works by 40,000 tons a year. All the alterations and expansion are being undertaken at the company's own expense.

SUPPLY TRANSPORT: The long-range flying boat above, designed by Vought-Sikorsky, will be built by Nash-Kelvinator. While only two have been built to date, production is expected to start at Nash shortly. They are designed to transport military supplies to the far-flung theatres of war.





HYDROPRESS INC.

ENGINEERS

HYDRAULIC PRESSES · ROLLING MILLS PUMPS ... **ACCUMULATORS**

570 LEXINGTON AVENUE . NEW YORK

Fatigue Cracks BY A. H. DIX

He Gave Us the Air

• • • You have yawned frequently over our claim that your favorite family journal is the world's most widely quoted industrial journal. We are fond of it because, like Earl Carroll's boast, "Through these portals pass the world's most beautiful girls," it is difficult to disprove.

But even we are tiring of it. So, upon being informed by loving friends that they hear the Iron Age mentioned on the air every now and then, we got in touch with an organization that keeps a record of radio mentions just as clipping bureaus check on references in print. We had visions of being able to prove that we out-Skelton the famous Red, but were quickly grounded by the air bureau man, who told us:

"If you hear of yourselves being mentioned on the air a couple of times, naturally you get the idea that there are hundreds of references which are unknown to you. But that isn't our experience. The chances are you have heard about every one."

He was polite but positive, and to make matters worse, seemed to know what he was talking about. So we are left with nothing to console us but our clipping book and the script of a broadcast by a WXYZ (Detroit) commentator containing the line, "Both the IRON AGE and the Senate declared that . . ." Anyway, we got priority.

Assembly Trick

Did you see the New York Times headline (June 16, page 4), "New Bureau Here Ready to Reunite Bomb Victims?"

— Deac.

"In"-truder

A headline in "The Assembly Line" reads, "Salvage drive to strip auto industry of all indispensable tools, dies, and machinery is launched by Council for War Production."

Take it easy, fellows!

A typographical error no doubt, but we can't let you ruin an otherwise perfect magazine.

T. Shelby Howard, Secretary,
 Howard Engineering & Manufacturing Co.,
 Cincinnati, O.

The little less than perfect, how perfect it is!

Language Lesson

• • • In common usage dispensable and indispensable are not opposites. Our drugstore dictionary does not even give the secondary definition of dispensable. It just says, "that for which a dispensation may be granted," while indispensable, of course, means absolutely necessary.

Maybe some day a student of the language like Henry L. Mencken will compile a list of words beginning with the negating prefix "in" or "im" whose alter ego, the positive form, has virtually expired from lack of exercise. A person without money is impecunious, but if he acquires wealth he is not said to be pecunious. A man may be said to be inscrutable, but his bare-faced brother is never referred to as scrutable. Among the other adjectives that are strangers without their prefixes are exorable, maculate, placable, perturbable, delible, vincible, pregnable, and domitable.

Stoppers

• • • Our bald spot is unveiled to the Baldwin-Southwark man who spotted that group photograph in the Pittsburgh Post-Gazette, captioned, "2,181 Perfect Shells, only One Bad—a Record," and made it the heart of the ad on page 21 of last week's issue. A stopper, if we ever saw one.

Slogans

• • I noticed with interest the controversy between you and G. Asbee concerning the slogan, "The man who is lax is helping the Axis." He suggests "The man who lax is, is helping the Axis. I think both your form and his are awful. Why the repetition of "is?" Why not, "He who lax is helps the Axis?"

-J. G. Hawley, Vice-Pres., Hawley Brake Corp., Corning, N. Y.

It is space-saving, but the inversion makes for awkwardness and reduces quotability. Why not "He who lapses helps the Japses?"

Full Cycle

• • • Lamson & Sessions' timely ad headed "When You Change from Steel to Wood Construction" reminds us that back in the '20s, when the shift from wood to steel for home and office furniture got into high, manufacturers were criticized for imitating the wood designs. They were told that this was slavish and unimaginative. In time metal designs came into their own.

The cycle is now complete. The other day we saw a wood filing cabinet, shaped and painted in such a way that you couldn't tell it from steel without scratching it.

How It Sounds to Them

• • • Miss Barmasel of the brains department has compiled a list of the various ways your favorite family journal has been addressed through the mails. They are:

I. N. H. R. & H. Lion Age Ion Age

We thought this just about exhausted the phonetic possibilities of our name as it bounces against stenographic eardrums, but a young lady employed by Freeland, Bates & Harris, of Boston, evolved a new one. She addressed us as "The Orion Age." Probably a lady air watcher.

Praise—Via Eye Dropper

• • • Your favorite family journal is now on the receiving end of a dangerously heavy barrage of bouquets. Everyone functions the better for an occasional kind word, but too many pats on the back create a Mickey Rooney. So we try hard to shield the brains department from the weakening influence of too much praise.

This orchid, sent us by the editor of a certain English metal-working paper, is exposed only because the publication's wartime address is so beautiful—3, Amersham Road, High Wycombe, Bucks. It's just right—like the polish on a \$25 pair of shoes. He says:

In passing I would like to compliment you on the continued high standard of The Iron Age. The interchange of technical information between American and British technical Journals is a very important contribution to the advancement of Industry, and your paper has acquired an enviable reputation in this respect.

Puzzles

 Last week's fence is one foot wide and nine feet long. Two more 1-ft. boards, one at each end, will double the area.

e area.

H. Kelsea (Eaton & Howard) Moore, Jr., sends this in: A boat has a speed of 8 miles per hour, and its bearing on a distant lighthouse is 30 deg. After proceeding on the same course for 75 minutes, the bearing on the same light is 60 deg. (a) How far is the boat from the light house? (b) How far from the light will the boat be when it is directly abeam, provided it keeps the same course? (c) How far from the light was the boat when it took its first bearing and (d) what was the total elapsed time from the moment the first bearing was taken until the boat was directly abeam of the lighthouse?

THESE SCALES HELP UPSET THE AXIS TIMETABLE!



THE speed and accuracy of modern Fairbanks Scales, and their many ingenious applications, are helping rush war matériel production.

Use your priority to get Fairbanks weighing equipment that will not

only save precious minutes now but also serve you best in years to come.

Fairbanks scale engineers are ready to help you plan for today with an eye for tomorrow. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago.

FAIRBANKS-MORSE



SCALES DIESELS MOTORS

Dear Editor:

PETER AND PAUL

Sir:

We would appreciate it very much if you would kindly mail us 150 reprints of your editorial, "Robbing Peter, Cheating Paul," by J. H. Van Deventer. This appeared in your edition of June 11, 1942.

R. V. REVERDY, Kay-Brunner Steel Products, Inc., Los Angeles.

Sir:

We thought so well of your editorial in the current issue, "Robbing Peter, Cheating Paul," that I think it would be a very good idea to put one of these in the hands of each draft board in our locality. If you can conveniently do so, we would appreciate having about ten additional copies.

CHAS. E. MUELLER,
President.
American Hollow Boring Co.,
Erie, Pa.

NE STEELS

Sir:

On page 126 of your issue of June 4, 1942, is contained information relative to the physical characteristics of the National Emergency Steels. One particular paragraph advises that the American Iron & Steel Institute issued the first batch of charts covering tests on NE steels.

If you have these available, we would like to hear from you, or would ask you to pass our request along to the American Iron & Steel Institute, as we do not have their address at hand. I want to take this opportunity to compliment you on the timely information you have published on this entire subject of NE steels.

CHARLES G. FALLON,

Sir:

Boston.

Kindly forward, at your earliest convenience, reprints of all up-to-date tables covering chemical analyses of NE steels as mentioned in latest issue of The Iron Age.

G. L. GAISER, General Supt., Bethlehem Steel Company, Pittsburgh.

• The American Iron & Steel Institute, 350 Fifth Avenue, New York City, is compiling these data and has already published a great deal of material on stiff cards suitable for looseleaf binding.—Ed.

CAST IRON CRANKSHAFTS

Sir:

In your May 21 issue you have an article on the manufacture of high test cast iron crankshafts. We are

very much interested in the article and would be very much pleased if you could give us the names of some foundries who could manufacture this type of crankshaft.

> C. A. HATHEWAY, President,

Palmer Bros. Engines, Inc., Cos Cob, Conn.

• We suggest you get in touch with the Meehanite Research Institute, 311 Ross Street, Pittsburgh.—Ed.

SCRAP RECOVERY

Sir:

We have read with much interest the article entitled, "German Recovery of Light Metal Scrap," in the June 4 issue. As this subject is of particular interest to us, we would like to obtain copies of the original articles.

P. W. ROLLESTON, British Air Commission. New York.

• The article you refer to appeared in the German magazine, ALUMI-NIUM, of March, 1941. Since THE IRON AGE article was practically a complete translation, the original will supply little additional data.—Ed.

RED TAPE

Sir:

Could you supply us with about one hundred reprints of "The Management Bottleneck" editorial? It may have some influence to send copies of this to certain officials, especially to departments continually requesting the same information. They surely must know that all of this "red-tape" only tends to hold up production. By this time they should realize we have on our hands a job to complete, and at the earliest possible moment.

M. E. ROGERS.
Secretary
The Cincinnati Lathe & Tool Co.,
Cincinnati.

ABRASIVE CUT-OFF MACHINE

Sir:

With reference to the problem of cutting off gates and risers from non-ferrous castings, mentioned in a letter published in the May 7 issue, a machine apparently suitable for this work has just come to my attention.

It is a rather large unit with a motor driven abrasive wheel, fitted with a circular table rather like a welding positioner. Called the Tabor-Brasive Universal Cut-Off machine, it is manufactured by the Tabor Mfg. Co., 6225 Tacony Street, Philadelphia.

FRANK J. OLIVER, Technical Editor

BRONZE SUBSTITUTES

Sir:

We are considering the manufacture of toilet tank flush valve guide arms of gray iron and before doing so we were wondering if you could advise us of the lasting qualities of gray iron as compared with brass.

Crest Manufacturing Co., New York.

• It appears that because of the smooth action required on this application serious difficulty would be encountered in using gray iron. There would be a tendency for the arm to rust, though the fact that it is almost constantly immersed in water might somewhat inhibit rusting. Under certain water conditions, it might be fairly durable, but as copper and brass would be associated with cast iron in the water, electrolytic corrosion would be present, too.

Certain plastics would undoubtedly be satisfactory, were it not for the high priority ratings required to obtain them. Have you considered the use of glass for this part? Some very tough glasses are today procurable, and readily so without priority. With a little redesigning, a glass guide arm might work very well.—Ed.

BLAST FURNACE MOISTURE

Sir:

In your May 14 issue, I noticed a letter to you on the subject of "Blast Furnace Moisture," signed by A. Dennison Williams.

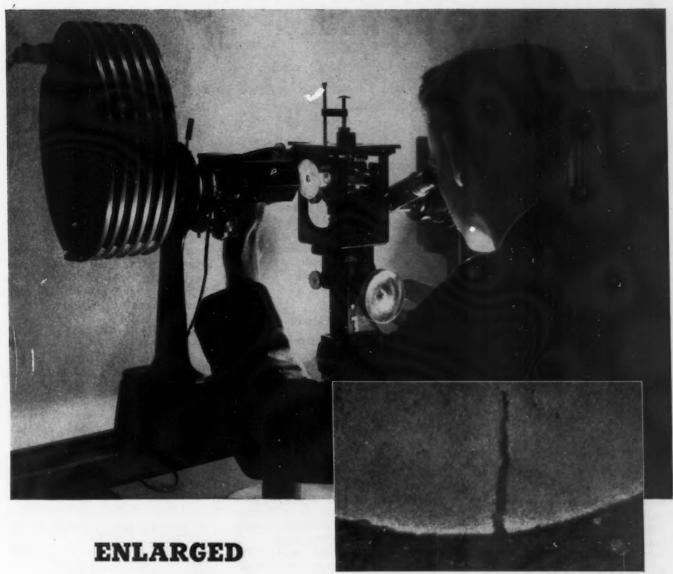
Mr. Williams stated that there is no secret as to the correct amount of blast moisture that a blast furnace needs for optimum production. If this is no secret, I wish some reliable authority would tell us, and all the blast furnace operators, just what the correct amount of moisture is.

It is readily possible and practical to install equipment to reduce the moisture content of the air entering the blower to 3 grains of moisture per cu. ft. It is also possible, at considerable increased installation and operating cost, to reduce it to 1 grain per cu. ft. I am sure you will agree that it is senseless to install equipment to obtain 1 grain if the correct amount for best operation is 3 grains or more.

This question of 3 grain plants versus 1 grain plants has been a matter of controversy among blast furnace operators for over a year, and I am sure that you would be doing both your industry and our industry a great service if you could clear up this matter in a rather authoritative manner.

J. G. BERGDOLL, Chief Engineer, York Ice Machinery Corp., York, Pa.

• Mr. Williams' letter was published here to stimulate discussion. Frankly, we don't know the answer either.—Ed.



3,000

TIMES TO PREVENT SPRING FAILURE Spring material must be as near perfect as possible. That's why Muehlhausen engineers use the Metallograph, illustrated above—to detect minute flaws.

Wire used in the Muehlhausen plant must undergo this test. A section of wire is mounted in a plastic mold and then polished. This specimen mount is placed in the Metallograph and photographed under high magnification. The developed print reveals the slightest interior fissure or surface crack.

This is only one of many tests customarily made by Muehlhausen engineers to insure quality in the art of spring making. Check with Muehlhausen on the design of any type spring—compression, extension, torsion or flat—hot or cold formed.

MUEHLHAUSEN SPRING CORPORATION

Michigan Avenue, Logansport, Indiana





This Industrial Week . . .

B AD news regarding the rate of ship sinkings in the Atlantic is offset to a degree by the fact that the transportation bottleneck to Great Britain has been at least temporarily broken in respect to steel shipments. Several hundred thousand tons of steel held at tidewater points some weeks ago has now been delivered.

While the piling up of steel on the docks has been checked, the demand for steel and other Lend-Lease materials is constantly growing. Pledges by the United States of still more aid plus our own requirements are placing a newer, higher goal before the mills each time one objective is reached.

Lend-Lease Hits Domestic Business

Lend-Lease aid, involving steel products such as ingots and semi-finished items, during the next 90 days will go far beyond what a few months ago was considered "allout" assistance. Such aid is already having repercussions in the scrap market, on domestic steel orders, and, within the next few months, is likely to affect steel profits and bear on steel prices.

This great war aid to the United Nations — Russia and China are also slated for very heavy shipments of Lend-Lease steel — has forced a complete reorganization of mill schedules at plants of companies receiving Lend-Lease business. Last week it was predicted that domestic business carrying allocations and A-1-a priority ratings would have to be pushed back in order to expediate production of Lend-Lease material. This week the pressure has increased. Some steel companies which were able to

work on domestic orders carrying such ratings as A-1-d and A-1-e find it impossible to schedule anything of less importance than A-1-a. At many plants, steel will not be available for some time on orders below A-1-a.

Semi-Finished Steel Exports Cut Scrap

Loss of scrap involved in large shipments of ingots and semifinished steel to the United Nations is a matter which is bound to be of concern to war production planners. Hundreds of thousands of tons of home scrap, which will be "lost" to America's allies in the next few months, will represent strategic material to their steel plants but will broaden the scrap deficiency in this country. With scrap demand already heavy, and with prospects of an acute shortage next winter, the loss of home scrap involved in the Lend-Lease shipments will weigh heavily on the iron and steel scrap industry. Steel mill scrap buyers are not optimistic over the prospects of accumulating sufficient stocks for the winter.

In addition to hampering the operations of non-integrated mills, greedy for material which now must be sent abroad or diverted to some other essential use, the heavy Lend-Lease orders will affect earnings of some steel producers. Steel manufacturers already hold that semi-finished prices are below cost in many cases. With the profits being made on finished products, they face a considerable loss of reve-

nue by shipping semi-finished material.

This week the steel and metal working industries were struggling to appraise a number of important developments. Lend-Lease difficulties were bewildering, but that was not all. The prospect of having a steel wage increase, as well as the closed shop, imposed by the National War Labor Board within the next few days is of itself a headache for which no remedy seemed in reach.

The steel wage increase, generally expected to develop out of the little steel cases now before the War Labor Board, is likely to be around 6c. an hour. Some variation of the closed shop is likely to be ordered by the Board. Objections that a steel wage rise would (1) hasten inflation, which is perhaps the greatest danger confronting the nation, and, (2) increase the burden on the Federal Treasury by diverting industrial tax payments to wages, apparently have been cast aside by the 3-man panel making the steel wage report to the War Labor Board.

Henderson Long Opposed to Wage Rise

Price Administrator Leon Henderson, in a statement last February before the WLB and in a letter addressed to President Roosevelt, flatly opposed "substantial" wage increases such as are being asked by the CIO. Mr. Henderson proposed a ceiling be put on wages because uncontrolled wages will bring inflation. It is a foregone conclusion that a steel

Steel Ingot Production—Per Cent of Capacity

(Open Hearth, Bessemer and Electric Ingots)

wage advance will bring pressure upon the OPA for some adjustments in steel prices in cases where the companies cannot absorb the increase. Equally interested in the War Labor Board's decision on steel wages, the union shop, and the checkoff of union dues, are the hundreds of steel-consuming plants and the allied industries which historically have kept their wage levels tied to steel wages.

While industry seems to be winning the battle of production, points at which war output is not yet coordinated unfortunately are not hard to find. One aircraft plant has laid off several thousand men to give its parts suppliers a chance to catch up. Some aircraft plants have an excess of material while others are dangerously dependent on daily incoming shipments. Frozen inventories of steel, estimated by one observer at as much as \$100 million, are likely to get more official attention. It is understood that at least 100,000 tons of a certain size cast iron pipe has been frozen by WPB orders. In general, the inventories are not of great size, but the aggregate of frozen steel inventories is said to be impressive.

68 Ships Totaling 632,000 Tons Built in May

Latest ship production totals are encouraging. In May, American shipyards put into service 68 new ships, totaling 632,000 tons, while in June one yard reports completing a 10,500-ton ship in 46 days. Approximately 36,000 tons of reinforcing bars will be required for the 24 concrete cargo vessels to be built under a Maritime Commission contract at a new yard in Florida. One ship will be completed this year and the others by June 30, 1943. These ships, propelled by steam reciprocating engines slightly smaller than those in the Liberty ships, reflect the shortage of ship steel. The commission also has either under construction or contract 33 reinforced concrete barges.

Machine tool shipments during May apparently edged above the \$103 million mark set in April. Heavier purchases by the Russians have increased the pressure on machine tool builders. Meanwhile, peak demand continues for small tools and gages, although produc-

Production Requirements Plan Instruction Booklet Now Ready

• • • In response to an emphatic and widespread demand, THE IRON AGE is issuing a 12-page PRP Instruction Booklet. This booklet, which supplements THE IRON AGE Priorities Guide, contains practically all the available information on how to operate under the Production Requirements Plan. In it are the official instructions, a table of the Allocation Classification Symbols, specific instructions on how to classify under PRP, and a handy alphabetical list of 1400 manufactured products, showing at a glance what symbol must be placed on orders for material.

what symbol must be placed on orders for material.

Prices are 25c. for 1 to 10 copies; 20c. each for 10 to 100 copies, and 15c. each for 100 or more. Please send stamps or coin with orders for \$2

or less. Address THE IRON AGE, 100 E. 42nd St., New York.

tion has reached record levels. Machine tools now being shipped are carrying a new war service marker, entitled "war finish," a result of WPB restrictions on the number of coats of paint which can be used.

Steel operations this week are at 99 per cent of capacity, unchanged from last week's revised rate. Scrap shortages in some areas are becoming severe and are holding ingot production below the 190 per cent mark. Lack of open hearth scrap at one plant in the Chicago area forced the shutting down of two furnaces. The length of the shutdown will depend largely on how quickly the WPB can arrange for a substantial allocation. However, such an allocation, unless drawn from some remote area, will cut the supply for some other plants. The strike that curtailed production at a Lukens Steel Co. plant has been called off and melting has been resumed.

Five steel-making areas, which this week report stronger mill schedules, include: Cleveland, up $3\frac{1}{2}$ points to 98 per cent from a revised rate of 94.5 per cent; Buffalo, $2\frac{1}{2}$ points to 107 per cent; Wheeling, four points to 87 per cent; Southern, four points to 98 per cent, and Philadelphia, two points from a revised rate of 90 per cent to 92 per cent.

Pittsburgh district operations are down a point to 99 per cent and Chicago is off a half point to 103 per cent, while other districts reporting lower production are: Detroit, down four points to 103 per cent; Southern Ohio River, three points to 109 per cent, and the Eastern district, 18 points to 92 per cent. Unchanged operations of 99 per cent were reported at Youngs-

town, 102 per cent in the West, and 108 per cent at St. Louis.

Canadian steel plants this week equalled the 99 per cent operating average of furnaces in the United States. Canada's steel production is said to be meeting approximately 60 per cent of its needs. However, arrangements have been concluded whereby the balance of the country's strictly essential war requirements will be filled by U. S. producers. Further restrictions on the use of steel are planned in Canada. One item to be drastically affected will be farm machinery.

Industry Struggles to Master PRP Details

This week the entire U. S. and Canadian metal working industry was struggling to master the details of operation under the new Production Requirements Plan, which, according to the WPB, provide the following sweeping changes in the priorities system:

- (1) Nearly every company using more than \$5,000 worth of basic metals in a calendar quarter must file a PRP application with WPB before June 30 for its material requirements for the third quarter.
- (2) Orders placed after July 1, and previously placed orders calling for delivery after July 31, must carry the explanatory symbols of the Allocation Classification system. (See page 116 of this issue of The Iron Age for list of products and symbols.)
- (3) After July 1, any priority rating may be extended by a single form of certification on orders for materials which will be delivered to the person to whom the rating was originally assigned or physically incorporated in products so delivered.



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FROM AN ORIGINAL DRAWING BY ORISON MACPHERS

OPEN-HEARTH MEN SPEED PRODUCTION OF FIGHTING STEELS

These men of the open-hearth steel furnaces move into action like army engineers working under fire. Swinging their shovels in determined, fighting rhythm they heave dolomite through the flame-licked door—making "bottom" in their furnace—preparing it for another charge of molten iron and steel scrap. Within minutes the furnace roars at white heat to produce more fighting steel for ships, planes, tanks, shells, guns, bombs...

On the charging floor at this battery of open-hearths, workmen are making steel at a fighting pace—a pace that prevails in all departments of the works every hour of every day—speeding every ton of it on the way to help win the war. By their skill and sweat these men of steel are doing what once seemed unbelievable—getting production from their furnaces and mills greater than 100% of their rated capacity.



JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON & STEEL WORKS • PITTSBURGH, PENNSYLVANIA
PARTNER TO INDUSTRY IN WAR PRODUCTION



News of Andustry

WPB Tool Surveys Expedite War Work

Pittsburgh

• • • Substantial expediting of war contracts is expected to result from surveys of critical tool capacity throughout the country now being made by some production and contract distribution branches of the WPB and soon to be made by the remainder of the field offices.

Boston, Philadelphia, and Cleveland regional offices have already submitted detailed lists of available open machine hours for various critical tools covering such items as boring, broaching, drilling, forging, gear cutting, grinders, lathes, screw machines, milling machines, planers, and thread millers, to industrial concerns in their respective area which may be able to utilize such available equipment. The latter is predicated on 168 hours a week in most instances, and a weekly report is being sent out listing type of machinery available and the number of open machine hours for such equipment which could be used for subcontracting work.

Any manufacturer who is in need of certain critical machine tool capacity may be able to find an answer to his problem by consulting the nearest contract distribution branch office of the War Production Board. (Location of these offices has been printed in the Sixth Edition of the Iron Age Priorities Guide, issued recently.)

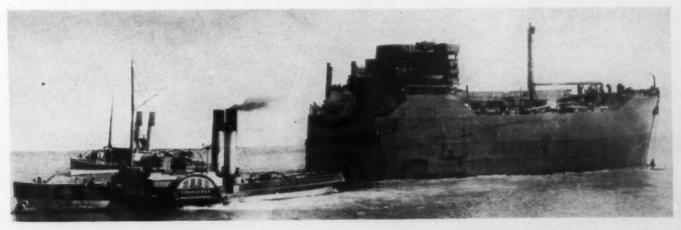
Within the next six weeks or so, regional area reports covering available open machine hours each week throughout the entire United States may be obtained as a result of a modern up-to-date checking service now being instituted by the WPB field offices. The cooperation between these offices and industry is reaching a new high and daily hundreds of questions resulting in placing of subcontracts are becoming the general rule.

An example of the weekly open machine data being gathered by regional WPB offices is shown in Pittsburgh area figures carried below. (Information regarding this particular list may be obtained from Alexander Pitcairn, Critical Tool Service Unit, WPB, 405 Fulton Building, Pittsburgh.)

Key No.	Type of Machine	Machin Hours
	BORING	
3	Horizontal-3" bar	. 544
5	Horizontal-to 4" bar up	. 461
5	Vertical-54"	. 1,385
6	Vertical—to 84" Vertical—to 120"	. 1,139
7	Vertical-to 120"	. 568
8	Vertical-over 120"	. 350
9	Jig borers	
10	Miscellaneous boring (Heald-Ex- Cell-O type)	
11	BROACHING	
21	Radial—6' to 8' radius	. 1,916

Key No.	Ma	pen chine ours
22	Radial-over 8' radius	
	Duplicating and profiling	
24	Drop-hammer, board-100 lbs. up	1,084
249	Drop-hammer, board—100 lbs. up Drop-hammer, steam—5000 lbs. up	636
25	Press-forging steam, hydraulic,	
20	500 tons upGEAR CUTTING	120
91-	Gear hobbers—48" and up	546
		671
	Bevel gear cutters	
32	Centerless	2 500
34	External cylindrical	2,702
35	Internal cylindrical	1,238
37	Thread	
47	Engine-24" dia., over 60" CC.	3,532
48	Engine-over 24" dia, to 60" CC.	2.051
49	Engine-over 24" dia to 96" CC.	2.763
50	LATHES Engine—24" dia., over 60" CC. Engine—over 24" dia. to 60" CC. Engine—over 24" dia. to 96" CC. Engine—over 24" dia., over 96" CC.	
90	Engine—over 24" dia., over 96" CC. Turret—12" dia., 2½" bar up Turret—to 24" dia., 2½" bar up Turret—over 24" dia., 2½" bar up Automatic—12" dia. Automatic—to 24" dia.	5.480
	The same to the same and the same and	1 300
51	Turret—12 dia., 272 dar up	9 695
52	Turret-to 24 dia., 2 /2 bar up	400
53	Turret—over 24 dia., 2 2 bar up	402
54	Automatic—12" dia	* * * *
55	Automatic—to 24" dia	
56	Automatic—to 24" dia	
64	Auto single 1"	898
65	Auto single—to 3"	800
66	Auto single over 3"	
67	Anto mult to 3/"	
68	Auto. muit. to 78	500
	Auto.—muit. to 1	100
69	Auto.—mult. to 3	190
70	Auto.—single—1" Auto.—single—to 3" Auto.—single—over 3" Auto.—mult. to 3" Auto.—mult. to 1" Auto.—mult. to 3" Auto.—mult. voer 3" Auto.—mult. over 3"	
73	Standard type-horiz, No. 3	2,572
74	Standard type-horiz, over No. 8.	1,349
76	Standard type-horiz over No. 8. Standard type-vert. No. 3 Standard type-vert. over No. 3.	311
77	Standard type-vert, over No. 3	480
78	Mfghoriz, 12" table width	156
79	Mfg shoriz over 12" table width.	248
84	Mfghoriz. 12" table width Mfghoriz. over 12" table width. Planer-over 30" table width slab	
85	mill Planer-over 30" table width side	
86	spindle Planer-over 30" table width ver- tical spindle Planer-over 30" table side and	
	tical spindle	
87	Planer-over 30" table side and vertical	398
88	Miscellaneous and die cutting-	
	Keller typePLANERS	
	COM	477.4
91	60" wide to 15'	474
92	60" wide over 15"	110
93	Over 60" wide to 15"	****
94	60" wide over 15'	268
103	and the same of th	614
104	Internal mills	****

HALF A SHIP LAUNCHED: This half of a merchant ship was recently launched and will be joined to another half that was saved following torpedoing by a German sub. Only half a bottle of wine was used in the launching.



Steel Prices Fail to Reflect Increased Costs

• • • The general level of prices in the United States increased 30 times as much as steel prices, from the pre-war level of July, 1939, to mid-May, 1942, according to a study by the American Iron and Steel Institute of generally recognized indexes of commodity prices.

Average steel prices advanced only one per cent between July, 1939, and April, 1941, when they were officially frozen. Meanwhile the Labor Department's index of wholesale commodity prices advanced 30.6 per cent between July, 1939, and mid-May, 1942.

Steel prices have almost entirely failed to reflect the higher cost of materials and of labor since the outbreak of the war. Prices of many commodities consumed by the steel insdustry have risen sharply. In addition, average hourly earnings of steel workers have an hour, nearly 17 per cent more risen to a new record of over \$1 than the average in July, 1939.

G-E Plant Purchases Second-Hand Bridge

Boston

• • • General Electric Co., West Lynn, Mass., on June 19 was awarded Navy E pennants for its West Lynn and River Works. Some 13,000 employees participated in the ceremonies. Unable to obtain steel priorities for a bridge between two Lynn plants, the company recently located an 88-ft. span in Newmarket, N. H., trucked it to Lynn and with the aid of an 80-ft. crane swung the span into place. It was not the first time the company has shopped about for second-hand materials to supply Lynn plant projects. The company has even bought unused manufacturing plants and demolished them to obtain steel beams, sashes and timber.

Tracy Manville Given OPA Advisory Post

Pittsburgh

• • • Tracy Manville, vice president, Columbia Steel & Shafting Co., Pittsburgh, has been appointed a member of the cold finished steel bar advisory committee by the OPA, according to Washington reports.

Navy Ordnance Plant 2 Years Ahead of Schedule

. . . Northern Pump Co., Navy ordnance plant, Minneapolis, has released a 40-page pictorial record of the war production operations and morale methods. Entitled "Building Production Morale," the booklet is a dramatic document on an important Northwest contribution to the war ef-Explained fully are the methods used by the management, the workers, and the naval personnel at the plant in developing the state of morale which won the coveted Navy "E," drove the plant fully two years ahead of contract schedule, and caused the War Production Board to single the plant out for special praise in its official Progress Report on the national war production drive.

H. J. Heinz Co. Will Make Airplane Parts

Pittsburgh

• • • Large scale production of airplane parts from plastic bonded plywood soon will be added to vital war work of H. J. Heinz Co. according to H. J. Heinz, president. One of the company's machine shops already is operating nearly one hundred per cent on sub-contracts to assist in the output of war materials.

In addition to producing considerable quantities of especially prepared rations for the United Nations' armed forces, H. J. Heinz Co. long ago offered the government the adaptable facilities of its factories. A thorough study of the company's factories revealed that some equipment could be immediately adapted to specialized work, particularly the manufacture of plywood airplane parts, Mr. Heinz said.

Synthetic Phenol Plant Studied for New York

• • • • Plans to construct a \$3,500,000 phenol manufacturing plant in western New York, to be operated by Durez Plastics & Chemicals, Inc., are under consideration, President Harry M. Dent has announced. Engineering surveys have been made preparatory to building a plant that would be the exact duplicate of a synthetic phenol plant built here in 1940.

Ore Consumption Totals 7,239,788 Tons in May

Cleveland

• • • Consumption of Lake Superior iron ore reached an all-time peak in May, according to the latest report of the Lake Superior Iron Ore Association. U. S. consumption in blast furnaces and open hearths was 7,015,408 gross tons in May and Canadian usage was 224,380 tons, a total that month of 7,239,788 tons. In April total consumption was 7,006,561 tons. In March U. S. consumption totaled 6,899,677 tons, best previous month.

For the year to June 1, U. S. and Canadian consumption totaled 34,917,021 tons, against 30,450,016 tons in the comparable part of 1941, according to the Association.

FLYING FORTRESSES: Vega, newest of the large Southern California aircraft plants, accelerated production on the B-17, "flying fortresses" without slowing up its output of the Vega Ventura, the twin - engined bomber for Britain. A bove, workmen in the final assembly are rushing one of the big bombers to completion, and below, a ship is being moved by overhead rail along the assembly line. The next station places the wings on the bomber.

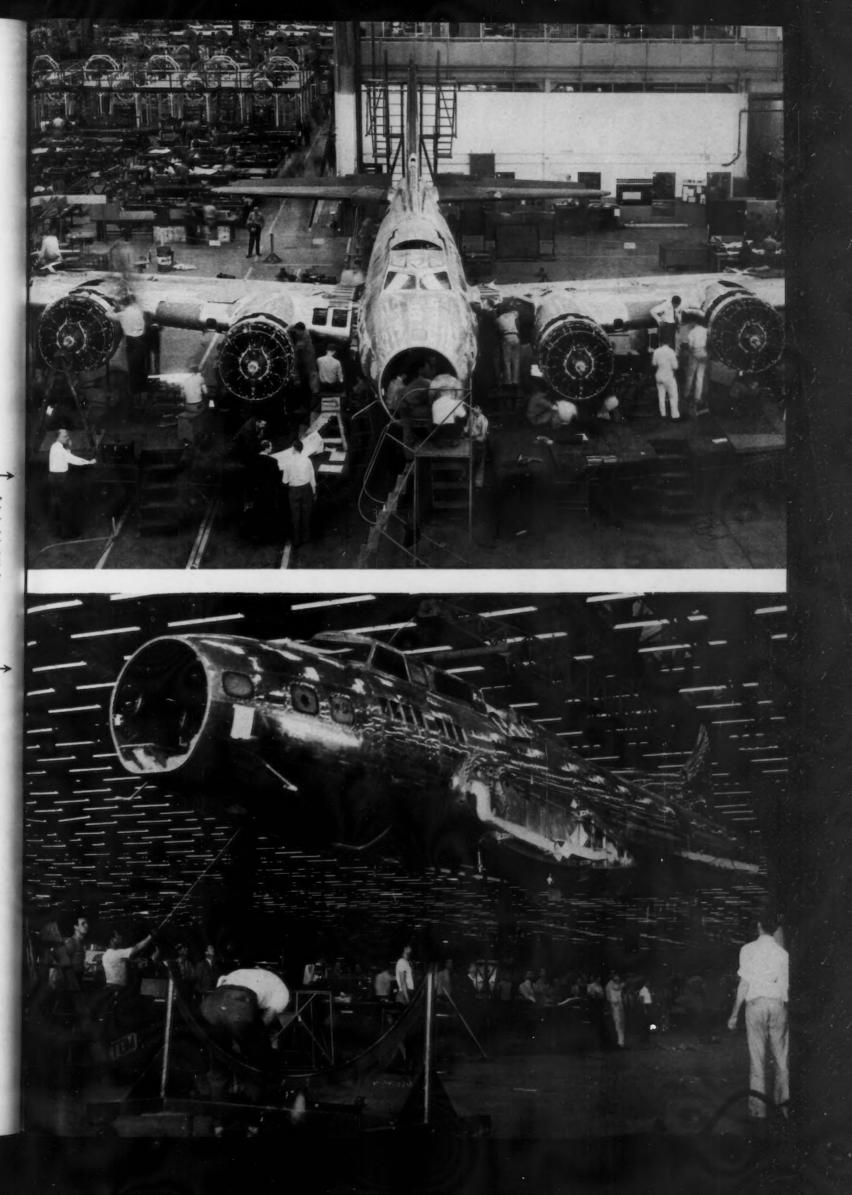
Ore on hand at furnaces and Lake Erie docks (U. S. docks only) amounted to 25,199,177 tons as contrasted with 20,064,744 on May 1 and 21,816,898 on June 1 a year

There were 178 U. S. and Canadian furnaces in blast on June 1, compared to 180 a month ago and 169 a year ago.

11.1,1,1

Pig Iron Allocation Altered to Save Cars

• • • Moving toward more efficient utilization of rolling stock, WBP is now allocating pig iron in such a way as to fully load the cars. Thus a foundry applying for a 40-ton allocation will receive 50 tons, and one that formerly preferred a mixture of 25 tons each from two different furnaces now receives a full 50-ton car from a single supplier.



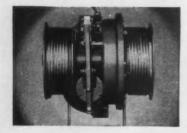


Only \$139.50 FOR 250 - LB. CAPACITY

Gearing.

America is racing against time. Minutes count! And the Conco Torpedo Electric Hoist can save precious production minutes. Push Button Control, Limit Switch, Electric Brake, Enclosed Mechanism are all features which contribute to faster, safer, more effortless operation. The Conco Torpedo Electric Hoist is available in 250-Lb. capacity—\$139.50; 500-Lb.—\$149.50; 1000-Lb. —\$159.50. And the simple, heavy construction of this hoist—employing only two gear reductions—means a long lived investment! Write for complete details.

SIMPLE HEAVY CONSTRUCTION



Illustrating Conco's double drum construction. Cast iron drums are 30 times diamater of plow steel cable. Load is better balanced; full lift is obtained without overlap of cable.

CONCO ENGINEERING WORKS

ORANGE DEPT. - MENDOTA, ILL.

For more than 20 years builders of hand-powered and electric cranes, hoists and trolleys.

Bulletin Describes Carboloy Dies for Small Cartridge Cases

• • • • A 12-page manual (Bulletin D-113) covering standardized Carboloy dies for small arms ammunition has just been released by Carboloy Co., Inc., Detroit. In addition to giving specifications of all standard Carboloy die sizes for 0.30 and 0.50 armor piercing jackets, tracer and ball jackets, cartridge cases, etc., the manual also has an operator training section covering the finishing and servicing of carbide dies. Details on equipment required, etc., are also included.

Oil Well Cased With Fibre Pipe and Concrete.

• • • The world's first oil well cased with fibre pipe and concrete as a substitute for steel is now said to be in successful operation. The experiment was supervised by the Illinois State Geological Survey, where the idea of using fibre pipe originated. In announcing completion of the job, F. P. Combier, vice-president, Fibre Conduit Co., Orangeburg, N. Y., stated that the new process will save steel and increase oil production.

Vanadium To Build Plants In Pennsylvania, Ohio

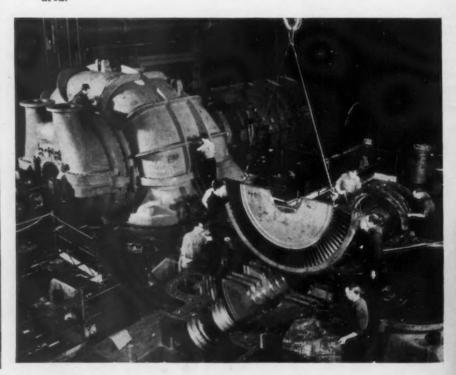
has awarded contracts for construction of two manufacturing plants, at a total cost above \$5,000,000, to the Rust Engineering Co., Pittsburgh. Located in Pennsylvania and Ohio, the plants will be financed by government funds. The Pennsylvania plant will be operated by Vanadium Corp. under lease, while the Ohio installation will be operated under a management contract.

Neither Union Wins Allegheny Ludlum Election

Dunkirk, N. Y.

• • • Although 1684 votes were cast in the recent NLRB election at the Dunkirk plant of the Allegheny Ludlum Steel Corp., a second election will be held June 24 because no union obtained a majority. The Steel Workers' Organizing Committee (CIO) polled 811 votes, while the Employees' Association unaffiliated received 773 ballots. Ninety-two votes favored neither and 472 eligible voters did not cast a ballot.

POWER FOR WAR GOODS: While most steam turbines now made go into ships, sizeable capacity in land generating equipment is also being turned out. These two General Electric units are being assembled for test and will soon be generating electric power in an important war production area.



THE NEW DETROIT

The Reconditioner

- 1. CHAMFERS R. & L. H. TAPS
- 2. SPIRAL **POINTS**
- 3. POLISHES SPIRAL **POINTS**

The new Detroit Tap Reconditioner has been developed to meet the need for conservation of tools under the War Production Program by decreasing tap consumption, decreasing tapping costs through increasing the output per tap during its useful life and providing an efficient low-cost method of accurately reconditioning taps.

Bulletin TR-1, describing the Detroit Tap Re-

Write for your handy Wall Chart—"Recommended Angles for Reconditioning Taps".

THREAD MILLING CUTTERS DETROIT

Company 8432 BUTL

THREAD GAGES

RING & PLUG

SPECIAL&STAND.

WITH A WAR TO WIN HOLLY SPRINGS RODE De-Luxe!

The day a half ton of special steel rode into Detroit on the deluxe Wolterine witnessed one of the war's achievements. To Holly engineers had been given the task of finding an American source to replace a crucial European product no longer obtainable the only steel ever to meet the uncompromising specification of a famous engine manufacturer. Holly resourcefulness accomplished the impossi-

Not all situations are as urgent but when "time is the essence" you can depend on Holly to come through.

Write, wire or better still . . . phone.





Employees' Suggestions Aid Murray Corp. Operations

Detroit

• • • Results of a three-month old employees' suggestion system in plants of the Murray Corp. of America show that new types of tools, new operation methods, easier handling of stock and other recommendations have been made and proved of value.

As a whole, 50 per cent of the suggestions received and examined have been approved, but one division has a record of 93 per cent and only 7 per cent rejected. This division also has the highest ratio of suggestions with 9.3 for each 100 employees. A more typical division has a ratio of 6.6 per 100. Typical of approved suggestions are:

Stock boxes to be placed on tilted racks instead of the floor, making access to stock easier and quicker.

Air hoses in the die room to be placed on reels instead of being scattered on the floor.

Shop blue prints to be mounted at work stations on boards which can be raised or lowered on pulleys are desired. Specific persons to be delegated to turn out lights in non-working areas.

Heat-treated (aluminum) rivets (for aircraft) to be dipped in alcohol before being placed in ice boxes, thus preventing their freezing together.

Several recommendations for new fixtures and improvements in present ones and many suggested new tools to replace present handoperation methods.

A system to connect the main steam lines serving various buildings so that steam can be bypassed from one to another.

Improvements in the parking lot to eliminate wear and cutting of tires.

Red bands to be painted on posts of fire extinguishers.

Portable shields for use with disk grinders.

Instructions to crib attendants in the care of precision tools.

WPB Steel Branch Moves To Social Security Building

• • • The entire personnel of the WPB iron and steel branch, Washington has moved from temporary building "R" to the first floor of the Social Security Building.

CELLAR SUB-CONTRACTOR: Hearing of a potential subcontract for cutting steel blooms, Dr. J. H. Bair, of Eberly's Mills, Pa., acquired eight hacksaws originally destined for Batavia, Java. He and his son, according to the Philadelphia War Information Bureau, doubled the speed of the saws and reset the blades to draw away the chips from the bloom, which had become magnetized. They are cutting 6x6-in. nickel-steel blooms into 80-lb. billets.



Heavy Purchase of Machines By Russians Reported

Cleveland

• • • Emergency demands from the West Coast, heavy purchases by the Russians and a pick-up in inquiries for automatics are the features of the market affecting builders here. The pressure of new business has eased for lathe makers. Local output continues at a high rate and will jump again next month with the completion of new production facilities. For the whole nation, machine tool shipments during May apparently edged above the \$103,000,000 mark set in April.

Price questions, particularly the new schedule which will become effective around July 1 governing outside production, appear to be attracting the most interest from tool builders at the present time. There are many angles of the new price schedule which have not been clarified yet. It is expected an amendment will be announced about the time the order becomes operative.

Peak demand persists for small tools and gages. Some users are forced to borrow and trade gages almost as extensively as a year ago, despite the fact production of these devices has reached an unprecedented level.

New projects in this vicinity are headed by the down-state tank arsenal, a bomber plant at Cleveland and a rifle job in western Ohio. The latter might become a revolver project ultimately. The cancellation of contracts on a certain type shell, which appeared likely last week, was withdrawn a few days later and work will go forward as scheduled.

Trade Notes . . .

CHAIN BELT CO. has appointed Industrial Equipment Co., 1301 59th Street, Oakland (Emeryville), Cal. R. W. Christofferson is general manager and Ray Smith is sales manager for the company which will distribute Rex construction machinery.

ROGERS DIESEL & AIRCRAFT CORP. is the new corporate name of the Cummins Diesel Engine Corp., of New York. The new company will continue to distribute Cummins company will continue to distribute Cummins Diesel engines, but will also handle Sheppard and Enterprise diesels. Management of the company, which also operates several other plants, continues to be the same.

DE LAVAL STEAM TURBINE CO., with orders on its books equivalent to many millions of horsepower, has been awarded the Navy "E" pennant in recognition of its contribution in industrial production toward winning the war.



structure and dimensional

tolerances. It is typical of the many round, flat and shaped wires that help speed Victory.

Roebling supplies them in long lengths, ready to fit right into your production schedule. These are only a few of hundreds of Roebling rounds, flats, and shapes...excellent examples of the kind of work that has built a reputation for Roebling.

If you require exacting steel analyses, dimensions within close limits, special finish ... it will pay you to call on Roebling. Through years of just this kind of work, we've acquired the skill and facilities to produce it...to meet your standards.

JOHN A. ROEBLING'S SONS COMPANY

TRENTON, NEW JERSEY · Branches and Warehouses in Principal Cities

Sub-Contractors

here's HELP for you



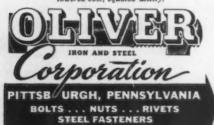
To help you get delivery now on essential steel fasteners, Oliver engineers are concentrating on methods of speeding production of special-purpose fasteners. Often, some slight change of design which does not affect the use of the bolt, will speed production by weeks and substantially lower your costs. Or perhaps the adaptation of one of our many standard bolts in place of these specials would not affect the application and might smash a serious production bottleneck in your plant. All special fastener inquiries are reviewed by Oliver engineers. Where alteration of your design would speed delivery, we offer our suggestions to you. These methods are assuring quick delivery to many contractors and sub-contractors who must not be delayed. This service is designed to speed your war production and Victory! Let Oliver help you with your steel fastener problems today!



This is a special purpose bolt that is difficult to produce quickly



A slight design change speeded delivery,



NEWS OF INDUSTRY -

Wood Replaces Steel For Some War Plants

Buffalo

• • • Wooden beams, trusses and girders rapidly are becoming a substitute for steel in the construction of war plants in this area. Contractors say that by using wood instead of structural steel the time in which a building can be constructed is cut almost in half. Beams and trusses are being fabricated on the job and have been found adequate for the purpose. The original cost of wood is less than structural steel but the labor costs of fabricating it and handling it are more, so that the final cost is just about the same as steel.

Iron Supplies to Foundries Liberal and Moving Promptly

Cincinnati

handling machine tool and high priority casting demands, find pig iron supplies moving promptly and their supplies fairly liberal. Conversion to war work by practically all foundries in the area has been completed except for some stove foundries. These plants, as a result of failure to convert, are on short schedules with the prospects uncertain. With the conversion steadily increasing, July iron requirements are expected to be even heavier than June.

Metal Shortage Closes Bottle Making Plant

Lockport, N. Y.

• • • Unable to get the metal needed for bottle tops, several firms which had bottle orders placed with the Thatcher Mfg. Co., glass bottle makers, have cancelled all orders with the result the bottle company announced a complete shutdown would be effective June 23. The plant employs 190.

Sleeping War Workers Houses Marked by Flags

• • • Homes of night war workers in Los Angeles, Cal., and Hartford, Conn., are marked with special flags, in order to insure traffic quiet for daytime sleeping of the "MacArthur Shift" workers.



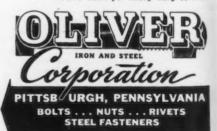
HERE'S an EXAMPLE!



George Haiss Manufacturing Company, a manufacturer of clamshell buckets whose equipment even now is clearing new air fields for America's wings, found that the teeth bolted to the body of the bucket were shearing off in heavy duty service. Oliver engineers were called in to solve this problem and recommended a change in the steel and heat treatment. Result, no more trouble... prompt delivery because a standard manufacturing process with only a special heat-treatment was employed. Why not discuss your steel fastening problem with Oliver engineers today?



Few manufacturers are as well equipped as Oliver to supply high tensile, heat treated bolts for heavy duty service.



Agencies That Handle Frozen Metal Stocks

Philadelphia

• • • According to the Phila-delphia War Information Cen-ter, various agencies of the Government, as well as private companies, have been appointed to take over frozen stocks of metals and commodities from manufacturers no longer per-mitted by WPB conservation and limitation orders to use such materials in the manufacture of non-military or non-essential civilian products. The agencies named are:

Copper and Copper Alloys: Copper Recovery Corp., 145 East 44th Street, New York.

n: Tin Salvage Institute, Inc., 411 Wilson Avenue, Newark, N. J.

411 Wilson Avenue, Newark, N. J.
Aluminum:
Federated Metals Corp.,
Branch offices in major cities.
Magnesium:
Federated Metals Corp.,
Branch offices in major cities.
Fabricated Goods:
Surplus Commodities Corp.,
Department of Agriculture,
ington, D. C.
Chemicals:

Chemicals:
Surplus Commodities Corp.,
Department of Agriculture, Washington, D. C.

Rubber: Reserve Corp., 811 Vermont Avenue, N.W., Wash-ington, D. C. Scrap Metal and Industrial Scrap: Bureau of Industrial Conservation, Industrial Salvage Section, Railroad Retirement Building, Wash-ington, D. C.

products, metals, and materials not listed above, formation concerning the dis-posal of frozen stocks may be obtained from the Inventory and Requisition Branch of the War Production Board. This branch may either requisition or direct the owner to the proper agency for handling the disposition of such stocks.

War Backlogs Taper, Salesmen Are Told

• • • All-out conversion of American industry to war production now is nearly complete and large backlogs of war orders are being diminished, Tomlinson Fort, of the Westinghouse Electric & Mfg. Co., told the American Marketing Association at its recent mid-year conference.

Arc Welding Graduation

• • • Caterpillar Tractor Co., Peoria, Ill., has announced the first graduation from its two-year sheet metal and arc welding course, which began in June, 1940. James Routt, 26, first student to start the course, was also first to finish.

What are "NE" steels?

Some Questions and Answers on New National Emergency Analyses

National Emergency (NE) Steels are a series of new alloy analyses, developed, at WPB's request, to supplant standard steels of rich strategic alloy content. These new analyses are recommended by WPB as alternates for present nickel, chromium and chrome nickel constructional alloy steels.

What is the Purpose of NE Steels? Extensive substitution of NE grades for present standard analyses will "stretch" our supply of critical nickel and chromium. Greater use of manganese and moly will help speed alloy steel production and deliveries. WPB states that "NE steels and certain others containing less, or no strategic elements will soon be only steels available". You are urged to change as quickly as possible, to be prepared when present standard analyses are cut off.

What are NE Analyses? A list of present standard alloy "specs" and recommended NE alternates, showing chemical compositions, may be obtained by mailing the coupon below to Peter A. Frasse and Co., Inc.

How About Physical Properties? Extensive tests are now being made on NE grades, results of which will be furnished on request. Conclusive data will be published as soon as sufficient tests are accumulated.

When Will They Be Available? Test heats have already been melted by most alloy mills. Frasse will stock NE grades as fast as mill rolling schedules permit. Details will be furnished shortly. Peter A. Frasse and Co., Inc., 17 Grand Street, N.Y.C. (Walker 5-2200) · 3911 Wissabickon Ave., Philadelphia, (Radcliff 7100 - Park 5541) .

> 50 Exchange Street, Buffalo (Washington 2000) . Jersey City, Hartford, Rochester, Syracuse, Baltimore.

FRASSE Mechanical STEELS

FRASSE

SEAMLESS STEEL TUBING · COLD FINISHED BARS ALLOY STEELS · DRILL ROD · WELDED STEEL TUBING COLD ROLLED STRIP AND SHEETS · STAINLESS STEELS

PETER A. FRASSE AND CO., INC., Grand Street at Sixth Avenue, N. Y. C.
Gentlemen: Please send me, without obligation, a list of recommended NE steels and their chemical compositions.
Name
Firm
Address



TRIPLE THREAT to a Paper Shortage!

MATERIALS ARE PRECIOUS RIGHT NOW. Increased demand taxes production capacity to the limit. So we can't afford to let "slips" ruin processed paper, foods, chemicals and other vital wartime products.

That is where users of Reading Electric Hoists find an extra margin of safety—both in processing and in handling processed products. When materials or fabricated parts drop or roll from skid trucks, the damage may be slight. But it is easy (and not expensive) to play safe the Reading way. Remember, it pays to rely on Reading's engineering ability.

Let us know your requirements and we shall be glad to show you how to provide greater safety for materials and workers in your plant—and perhaps reduce insurance premiums at the same time. There is no obligation, of course.

If you would like to simplify your materials handling problems, ask for a copy of "144 Answers to Your Hoisting Problems". It will be mailed to you postpaid.

READING CHAIN & BLOCK CORP. DEPT. A-7 READING, PA.



READING

Chain Hoists, Electric Hoists, Cranes and Monorails

Bottleneck Forms In Small Tubing

By D. R. JAMES

• • • Rapidly becoming as critical as the steel plate situation is the jam on cold drawn seamless steel tubing and electric weld tubing in small and medium sizes, vital to the war effort.

Producers hold unprecedented order backlogs and are receiving frequent new inquiries for millions of feet of tubing. Demand stems from the need for heat exchangers for ships and synthetic rubber plants; Army tanks; bombs, and airplanes. In addition, several new war uses of tubing are on the boards awaiting approval of Washington.

Four-and-a-half months in the future is often the best delivery promise that a holder of an A-1-a priority rating can obtain. The situation is so critical that Reese Taylor, chief of the WPB Iron and Steel Branch, has appealed to cold drawn seamless users to make use of more substitutes, and there are indications that where electric weld tubing is being used as a substitute the government may be

forced to ask that some other substitute be employed.

A new committee has been appointed to go over the whole situation and chart ways to ease the jam. Meanwhile, on aircraft tubing a unique control over orders is operating with considerable efficiency at Wright Field, Dayton, Ohio Users of aircraft tubing are sending their orders to Wright Field, rather than to steel mills. Wright Field analyzes the orders and assigns them to the proper mills. The buyer and the mill are notified simultaneously and the order is consummated.

Big production of welded chrome molybdenum tubing for the aircraft industry is under way. Electric weld mills are handling small sizes, leaving the four principal seamless aircraft tubing mills free to work on larger sizes.

In the heat exchanger field no substitutes for seamless have been used up to the present time, although several have been suggested. The most logical, which is understood to be under consideration at Washington, is the use of extended surface tubing made of electric weld. A process has been perfected for welding to tubing,

ENGINE BALANCE: This two-in-one scale indicates the weight at each end of a master rod and is used in checking the parts used in the Wright Cyclone, 1700 hp. engine. Total weight must not only be correct but weight must be distributed to correctly balance the weight of the articulated rods that fit into the master rod and pass on the power to the crankshaft.

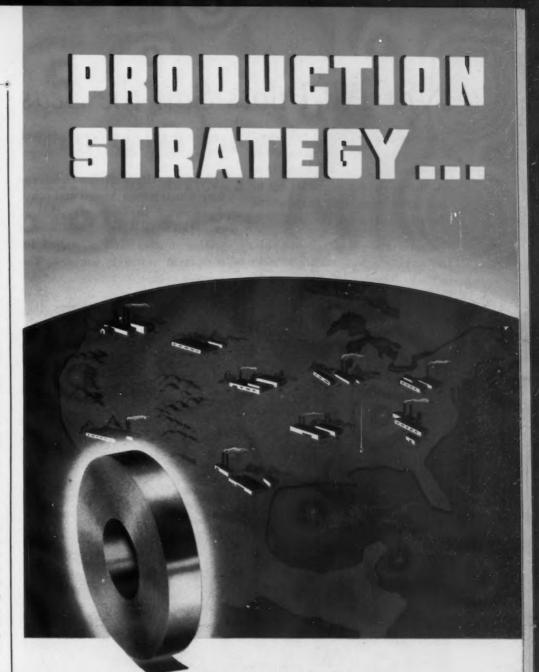


longitudinally, channels made from cold rolled strip steel. The process employed to weld these strip channels to the tube is a high-speed production method. The actual cost of fintube surfaces is low.

By virtue of the substitution of this extended surface on fintubes produced on this process, one foot of tube is made to function where from four to ten feet of tubing were required previously. Fewer tubes are used, resulting in a commensurate saving on all works incidental in locating these tubes.

The use of extended surfaces in industry is no new phenomena, but rather has been increasing from year to year. The greatest obstacles in its further use and extension appear to be (1) prejudice based upon either preconceived faults or due to unwise previous use of fintubing on the part of operators, (2) a general lack of honest and authentic data for the use of design engineers in working up fintube exchangers, (3) ignorance on the part of many heat transfer engineers as to the possibilities of fintube in heat exchangers, and also a lack of understanding of its abilities to produce heat transfer. For the above reasons, considerable pressure would be required to increase the use of fintubing in heat exchangers during the war effort beyond that normal increase shown to be probable from the experience of recent years.

This type of tubing is in use in use in many large refineries already. It is also being used on the so-called "Liberty Ships" in the fuel oil heaters. They have also been used in several Navy ships in a like capacity. It has been used on several of the large Naval Bases in suction tank heaters used to heat Bunker C and Navy 1 fuel oil to lower its viscosity for pumping. It has been used in oil refining and in the chemical industry in the convection banks of many types of furnaces. It is being used in at least two nitrate process toluene plants, the specific use not being mentionable. It is being used in the economizers being built for the United States Navy and the United States Maritime Commission by Combustion Engineering and the Superheater Co., of East Chicago, Ind. It is also being considered as surface for the cooling of coke oven gases as produced by steel mills.



WITH THOMAS COLD ROLLED STRIP STEEL

The manufacturing of war products in America's factories calls for production strategy as it applies to mechanical operation as well as to the selection of materials. On this basis, Thomastrip has many practical applications for war products. Thomas cold rolled strip steel meets the requirements for lightweight precision parts. Our engineers will gladly apply their wide experience and knowledge to the solving of your problems. Write today.

THE THOMAS STEEL CO. . WARREN, OHIO



IN

Not All Pilots Sail the Seas

When a steamer "drops the pilot," it means the dangerous rocks, shoals and currents are passed. From there on, the navigator is guided by his own knowledge and calculations. The pilot has shown the way.

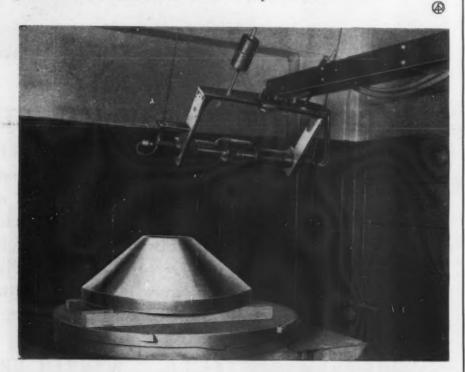
Amsco uses pilots, too—to point the way to a consistently sounder product. These pilot castings—the first of each new design or new foundry practice—are carefully checked by a giant 400,000 volt X-ray machine at the Amsco Chicago Heights plant. This X-ray, until recently one of the largest used in metallurgical work, is capable of making diagnostic radiographs through five inches of steel.

These investigations are made not only to detect any defects in that particular pilot piece, but also to supply data to the engineer, foundryman and metallurgist which will enable them to correct recurring defects by changes in design, or method of production. The result is that the

customer gets a superior product of known quality without extra charge.

Added to this is a research laboratory which serves Amsco and other divisions of the company, that is equipped with standard and special testing devices, and is staffed by competent research workers. The purpose of these technicians and this elaborate equipment is to evolve changes in metals or methods that will give users of Amsco products, castings more uniform in quality or better in performance.

Today more than ever before, American industry demands speed, speed and more speed. It must have consistent performance, too. Amsco 13% Manganese Steel castings deliver maximum service, with minimum maintenance and replacements to meet the nation's insistence on metals and machines that can take it under exceptional conditions. Amsco is doing its duty in this "war of production."





Manganese Steel Castings for shocks and abrasion.

Chromium-Nickel Alloy Castings for heat and corresion resistance.

Power Shovel Dippers. Bredge and Industrial Pumps.

Walding Materials for reclamation and band surface

Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.;
LOS ANGELES, CALIF.; ST. LOUIS, MO. OFFICES IN PRINCIPAL CITIES

Industrial Maintenance Program Set Up by Westinghouse

• • • • To keep present facilites in industrial plants at peak production, a new maintenance program stressing fewer, shorter and longer-lasting repairs has recently been set up by the Westinghouse Electric & Mfg. Co., according to H. R. Meyer, manager, maintenance sales section.

Highlights of the program are regularly scheduled Westinghouse-customer contacts for the purpose of making necessary inspections, inventories and repairs. Maintenance sales engineers will be available to help determine renewal parts requirements and to make recommendations on specific electrical problems on request. To keep the machines running, a schedule will be made of repair work to be done in Westinghouse service plants.

The maintenance sales department consists of a group in each district sales office to assist the salesman in making sure that renewal parts are provided to take care of run-of-mine maintenance work, with emphasis on speedy action to get the machine back on the line should a breakdown oc-Backing up the district offices and repair plants is a closely-allied headquarters group composed of representatives from the various manufacturing divisions, and district engineering and service and repair plant management.

As a part of this general maintenance program, Westinghouse has also prepared a two-volume set of maintenance rules and regulations, consisting of 15 chapters for loose-leaf insertion in 5 x 7-in. binders. Volume I covers inspection of electrical apparatus, insulation materials, commutator maintenance and the starting and regulating of various types of d.c. and a.c. motors. Volume II is devoted to contactor maintenance, the inspection of transformers and a chapter on transformer connections. A large number of diagrams clarify the text.

A pasteboard maintenance check chart, $16\frac{1}{2} \times 21\frac{1}{2}$ in., is also available, covering motors, controls, arresters, wiring fuses and transformers. Chart and books may be obtained from department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh.



DIVE BOMBER INSURANCE: This gun crew, aboard an aircraft carrier, have found that a 50-caliber gun of the type shown here is one of the most effective weapons for combatting dive bombers.

Vanadium Melting and Deliveries Controlled by WPB

• • • Melting of vanadium and delivery of any amount over 10 lb. per month, were placed under complete WPB control in an amendment to the vanadium conservation order, M-23-a. Vanadium has been under allocation control for nearly a year. Nothing in the previous order restricted the melting of vanadium, but the amendment prohibits melting of any present or future stocks except on specific authorization or unless the melter's schedule has been approved as provided in the iron and steel alloy order, M-21-a.

Paper Paint Cans

• • • Paper paint cans are the latest contribution of Sherwin-Williams Co. to the war conservation drive. The top and bottom of the new container, which is the result of several months of experimentation at the company's Chicago plant, are metal (alloy coated plate) disks, but the body is made entirely of cardboard impregnated with an insoluble substance. No tin is required.

"Full speed ahead ...AND DUMP THOSE CANS!"





OFFICIAL U.S. NAVY PHOTOGRAPH

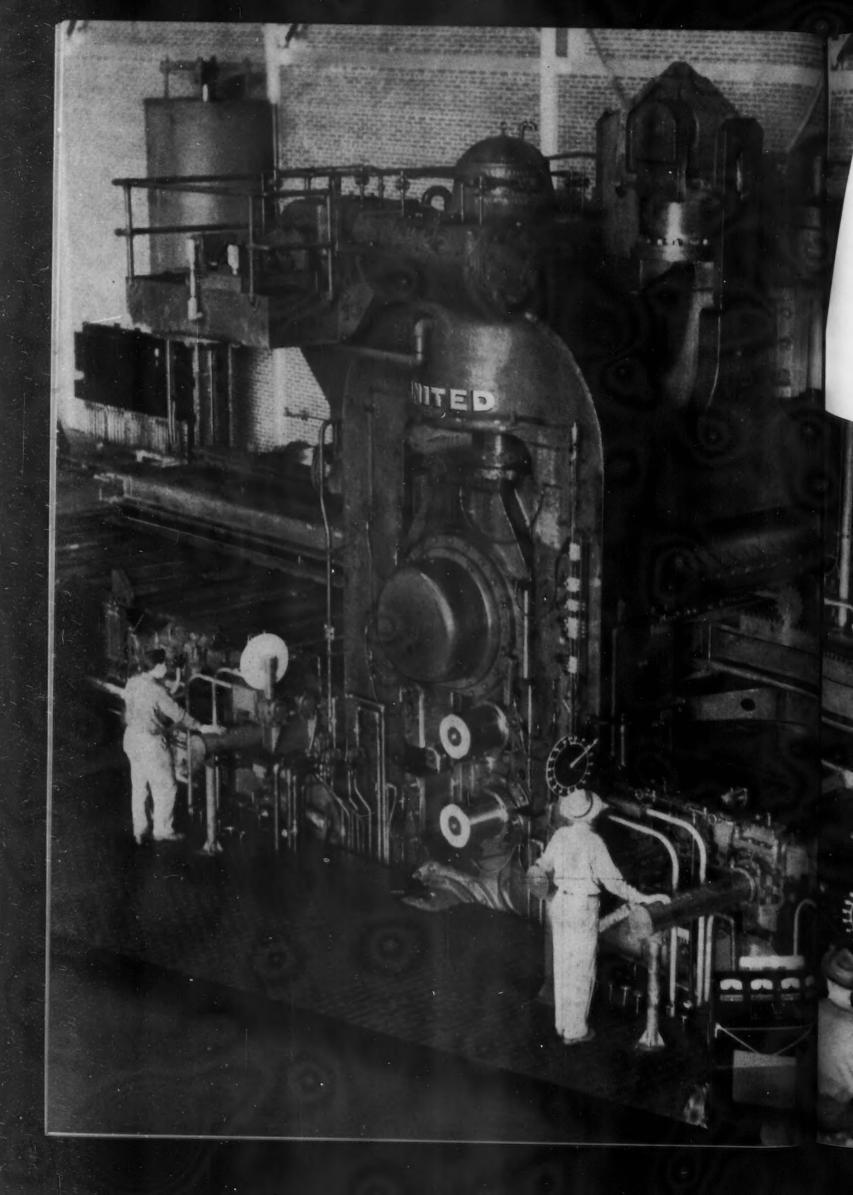
That's the order of many ship commanders these days as America's speedy destroyers hunt enemy U-boats on the seven seas. It's grim business, yet Uncle Sam's men-of-war are well equipped for their dangerous tasks.

Part of the equipment in many American destroyers is made of Armco special quality sheet metals. Armco Stainless Steels go into many vital parts. Armco Cold Rolled Steels are used for deadly depth charge cases.

These are only a few of the war jobs that special ARMCO iron and steel sheets are doing. Their uses range from submarines to warplanes, from combat cars to cruisers and from land mines to mess equipment.

If you make essential war equipment consider using ARMCO special quality sheet metals. Let's talk it over. Write The American Rolling Mill Company, 2221 Curtis Street, Middletown, Ohio.





4 High Hot Reduction Mill for rolling Aluminum and Aluminum Alloys

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DAVY AND UNITED ENGINEERING COMPANY, LTD., SHEFFIELD, ENGLAND DOMINION ENGINEERING WORKS, LTD., MONTREAL, P. Q., UNITED INTERNATIONAL, S. A. PARIS, FRANCE

Lincoln Electric Wage Incentive Plan Explained

• • • Following his return from a Congressional investigation into the wage incentive system of the Lincoln Electric Co., James F. Lincoln, president, decided that his wage incentive system deserved serious consideration by American industry in general and offered more data than has ever been supplied before to support his opinion. Mr. Lincoln revealed that the productivity in sales volume per employee had increased from \$8371. in 1933, prior to the launching of the bonus payment system, up to \$18,150 in 1937, representing a gain of some 120 per cent, whereas the productivity per employee in the machine tool industry showed a 75 per cent gain and employees working in plants producing electrical machinery, apparatus and

supplies, showed a 42 per cent gain. He indicated that in 1941, the productivity per employee had advanced further to \$25,025, and predicted that this year the productivity per employee might reach as high as \$30,000. Moreover, he stated that he expects to do better next year, and states that thus far he sees no near term end to this increase in productiv-

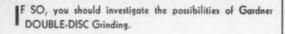
ity per man hour.

The most remarkable part of Mr. Lincoln's wage incentive plan is that productivity per man-hour would have shown even greater strides than the figures reveal if the company had not followed a policy of steadily reducing its prices of electrodes and electric welding machines. About twothirds of the company's business is in electric welding rods, on which prices have been steadily reduced from 11c. to 4.8c. per lb., which is the present level. Moreover, it should be pointed out that the company has absorbed an increase of some 20 per cent in raw material costs since April 1, 1940. At the same time, the company's horizontal type welding machines were reduced from \$550 in 1933 to \$360 in 1941, and vertical type welders introduced in 1939 at a price of \$235 are now selling at \$200 per unit.

Greater productivity is not only attributed to the willingness of the men to work harder at their machines, but also to the initiative and drive of the company's engineers, who have developed certain improvements and innovations in manufacturing methods, permitting some of the reduction in costs. Yet, the company has maintained its profits on a steady level, electing to pass on the results of manufacturing improvements to

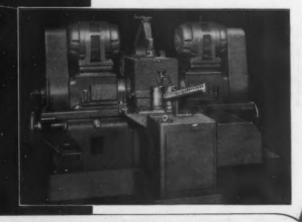
their employees. The Lincoln Electric Co. at present is handling 50 per cent of the total electrode business and half of the total welding machine volume in the United States, Mr. Lincoln pointed out. Manufacturing costs are even lower than those in efficient German plants despite the fact that German workers are paid very poor wages. The company's present backlog amounts to some 32 weeks of business on welding machines and orders for welding rods assure peak operations for the remainder of the year. The company at present has 1000 employees, having in-





For example, the steel thrust washers having parallel faces of UNEQUAL area, shown here, are ground, two sides simultaneously, on a Gardner No. 120A-23" Double Spindle Grinder, using a "push-thru" fixture with a rubber-roll feeding attachment. The parts are supported, during grinding, on steel guide bars which extend through the machine between the abrasives, and are fed in a constant stream, dropping out at the rear. Ample coolant is used, and excellent finish and accuracy are obtained.

PRODUCTION, on washers approximately 2" O.D. x 11/4" center hole, averages 30 per minute, holding within .001" for flatness and parallelism, and .002" for uniformity.



Gardner Double-Head Grinders, carrying heavyduty WIRE-LOKT Abrasives (see illustration below), will turn out YOUR parallel-surface iobs with similar results.

> Write for data DOUBLE- DISC GRINDING!

GARDNER MACHINE CO.

412 East Gardner St., Beloit, Wisconsin, U. S. A. "Gardner-Grind Your Flat Surfaces"



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GASOLINE TRAFFIC: Synthetic rubber fuel tanks, which may turn railroad box and gondola cars, wooden barges, boats, and trailer trucks into tankers to carry gasoline and oil, have been designated by the Glenn L. Martin Co., makers of the B-26 bomber. Known as the "Mareng cells," the tanks, after delivering the fuel to its destination, may be rolled up into compact packages and expressed back, making the conveyance available for return freight.

creased to the present number from some 500 at the time the war started. In connection with the newer men. Mr. Lincoln revealed that \$1,000,000 has been set aside as a "separation wage" for the new employees to permit them to be tided over the next depression so that they may be able to secure other positions at such time as Lincoln may not be able to retain their services any longer. The company's total output has increased from some \$10,709,000 worth of business in 1937 to last year's rate of \$24,024,095. Mr. Lincoln expects this year's volume to approximate \$36,000,000. He estimated that his price reductions had saved the government about \$1,400,000 in one year.

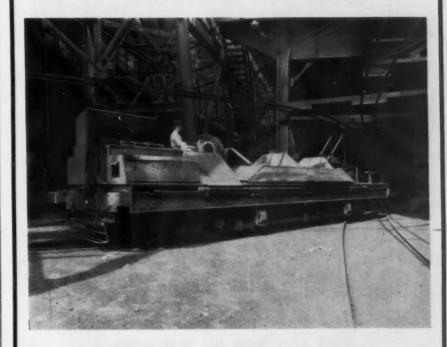
In elaborating on his incentive pay plan, Mr. Lincoln stated, "I believe we have the solution to paying high wages and charging low prices. It is the desire of the worker to have a place in the sun and a feeling that he is doing a job well." He pointed out that

during the Congressional hearing, Mr. Vinson had stated to the committee, "I want to see companies giving bonuses, but that is to the people who are doing the work. I think that is a very healthy situation to have everybody interested in a company, because then they feel part and parcel of the company and you won't have so many strikes throughout the country."

The company's plant is now operating on a three 8-hr. shift

basis, six days a week, with some work being done in some departments on Sunday. Mr. Lincoln states that the attitude of the employees is also reflected in the negligible amount of absenteeism going on at the Lincoln plant. Besides the rather substantial bonuses paid to employees, depending on the company's profits in any year, employees get two weeks' vacation with pay, have insurance and annuities.

ATLAS SCALE CARS



Our 46 years of experience building heavy duty Scale Cars for Blast Furnace Service assures reliability, accuracy, and lowest maintenance.

The ATLAS CAR & MFG. CO.

British M.P. Formerly An Engineer with Budd Mfg. Co.

• • • A dynamic personality recently made a member of Parliment in England is a British industrialist who gained his first manufacturing experience in American industry. Several years ago, w. Dennis Kendal, now managing director of the British Mfg. & Research Co., Ltd., was an efficiency engineer with the Ed-

ward G. Budd Mfg. Co. of Philadelphia.

Born in Halifax, Yorkshire, in 1903, Mr. Kendal intended to be an accountant but at 14 went to sea as a cadet in the Royal Fleet Auxiliary. He saw service with the navy all over the world, including Russia during the revolution. In 1921 his ship docked at Washington and without permit or money or a single acquaintance, he jumped ship and began a seven-

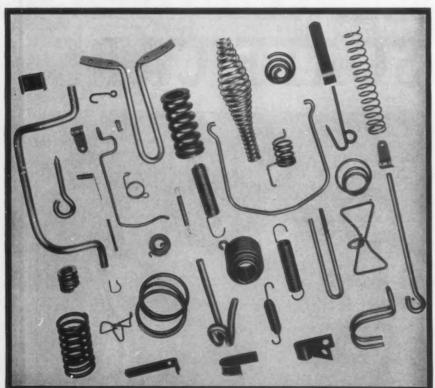
year stay in the United States. His first job here was as a steeplejack putting up wireless masts. That was the first of a whole series of tough jobs which included bargee, house painter, and chauffeur.

Eventually, an employment office in Philadelphia sent him along to the Budd company where he was given engineering training and ultimately became an inspector.

In 1928 William J. Meinel, then vice-president of Budd and now president of the Heintz Mfg. Co. of Philadelphia, sent him to Paris to reorganize the Citroen Works in line with American methods of manufacturing. During this period he remanied on the Budd payroll.

In 1938 the British government asked him to come and start a group of factories in England. He arrived by plane with four bundles of drawings as his total stock-in-trade. He surrounded himself with business associates from the United States and from his native Yorkshire and on the principle of "biggest, brightest and best" of everything, he spread his personality in model factories, and the latest machines.

Springs for WAR JOBS!



IF YOU NEED SPRINGS, wire assemblies, wire parts or small stampings for war equipment, Cuyahoga's wide experience and facilities for applying the flexibility of spring and wire design to defense applications is available for direct war or sub-contractor requirements.



Sheet Rollings Confined To A-I-a Rated Orders

Cincinnati

• • • • Sheet steel producers in the southern Ohio district report such a tremendous increase in high priority business that rolling schedules are virtually limited to A-1-a business. Even with full operations on top priorities, steel producers are still unable to handle all of the business and report some small backlogs building. Of course, with only A-1-a rollings, all other priority business also tends to go into the reserve against the time when space can be found for it.

Navy "E" Award Goes To Clark Controller

• • • • Before 1500 employees and friends of the Clark Controller Co., Cleveland, Rear Admiral W. C. Watts presented the Navy "E" pennant to the company's president, P. C. Clark, Admiral Watts, who saw convoy service in the last war, said that Clark employees and management could be proud of their contribution to the war effort of the United Nations.

NEWS OF INDUSTRY -

Canada's Steel Output 60% of Its War Needs

Toronto

• • • Steel production in Canada is holding at 99 per cent capacity, which is practically the limit possible for ingots with prevailing supplies of raw materials. While some rolling mill departments, such as plate and sheets, are exceeding their rated capacity, other branches have been on reduced production schedules.

the brunt of the curtailment policy and as a consequence there is a severe shortage of these materials in Canada, and supplies are not sufficient to take care of the actual been some slowing down recently total steel production is said to be arrangements have been concluded tial and war needs, are being pro-

sult that the entire war materials tial group.

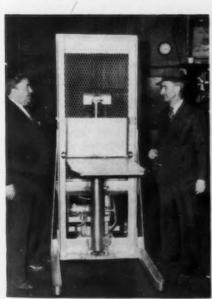
J. H. Berry, Motor Vehicles Con-

troller for Canada, has issued an order which reduces production of replacement parts for all automobiles and trucks to 70 per cent of the 1941 value and arrangements have been made for a priority system in the distribution of available supplies. Starting with the months of May, June and July, and continuing for each succeeding three-month period thereafter, the production of the specified replacement parts is limited to 70

production capacity cannot be put into operation. In an effort to provide a greater flow of steel directly to war industry, the Department of Munitions and Supply has placed further restrictions on use of steel in other branches of industry, the latest action being directed toward the so called essen-

Wire and nail mills have borne war requirements. Also there has in bar mill operations. Canada's equal only to about 60 per cent of the country's war needs. However, whereby the balance of the country's requirements, strictly essenvided by United States producers. Under existing production the supply of steel is not equal to the demand of Canada's steadily expanding war industry, with the re-NINE MAN PLANT WINS "E": The Moto-Truc Co., Cleveland, employing only nine men, won the Navy

"E" for production of electrically operated lift trucks used in Navy depots. The plant supplied the Navy with 70 per cent of its output. J. P. Hoffman, president, is shown at left, and Irvin F. Schreck, vicepresident is on the right.





per cent in total dollar value of similar parts sold or supplied during the corresponding periods of 1941. The production quota is accompanied by certain restrictions on inventory of finished parts. Producers may now manufacture only the following units and the component parts entering into such units: Engines, clutches, transmissions, propeller shafts, universal joints, axles, brakes, wheels, hubs, starting apparatus,

spring suspensions, shock absorbers, exhaust systems, cooling systems, fuel systems and fuel system caps, lubricating systems, electrical systems including generators, lights and reflectors, gages, speedometers, rear-view mirrors, windshield wipers, windshield wipers, windshield wiper motors, control mechanisms and steering apparatus. A distributor requiring a replacement part for an essential vehicle which cannot be operated without such a

part must file with a producer an emergency order certificate. Such an order must be given precedence over an order of a non-essential nature.

Officials of the Department of Munitions and Supply state that the 70 per cent output is expected to supply the requirements for replacement parts in Canada, since it is anticipated many cars will be off the road because of inability to get tires and for other purposes. As a result of previous orders by the government, no new cars are now being made in Canada.

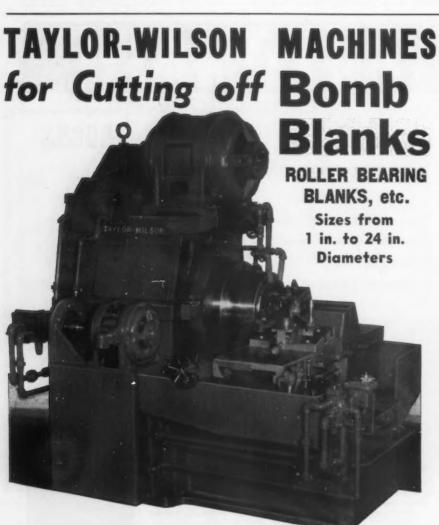
Mr. Berry also announced that rubber, metal and other materials may no longer be used in the production of motor vehicle accessories, with the exception of heaters, defrosters and other parts required by law. This new order will affect the manufacture of many familiar "gadgets," now used on automobiles and trucks. Among the articles whose manufacture is prohibited are bumper guards, rubber covers for clutch and brake pedals, rubber floor mats, cigar lighters, dome lights, steering wheel knobs, fog lamps, running board scuff plates, radio aerials, clocks and coat hangers.

Stressing the importance of steel for the war effort, H. H. Bloom, administrator of farm and road machinery for the Wartime Prices and Trade Board, stated that production of farm machinery in Canada next year will be limited to 25 per cent of the 1940 output and imports will be similarly regulated. He also urged that "utmost use" be made of every farm machine and tool to maintain food production.

Garner Heads Mellon Institute Container Study

Pittsburgh

• • • A multiple fellowship on chemical containers and storage has been established by Pittsburgh-Des Moines Steel Co. at Mellon Institute of Industrial Research, Pittsburgh. The senior incumbent of the fellowship is Dr. James Bert Garner, known for his achievements hydrocarbon in chemistry and technology. He is aided by Ludwig Adams, a specialist in engineering materials and welding and by R. M. Stuchell, a research metallurgist.



Designed for maximum speed and close tolerance in cutting set lengths. Especially valuable for cutting Bomb Blanks, also Roller Bearing Blanks, Coupling Stock, etc. Will take all grades of steel including N-80 seamless tube.

These Cutting-Off Machines when operated with the Taylor-Wilson Pipe Handling and Feeding Devices greatly reduce operating labor. The operator manipulates the entire process of feeding, cutting-off and disposal of the pipe from one position. This eliminates much labor and time and accelerates production.

TAYLOR-WILSON MFG. CO.

25 THOMSON AVE. (Pittsburgh District) McKEES ROCKS, PA

Canada's Labor To Go On a Priority Basis

Ottawa

• • • New regulations are to be introduced in Canada immediately with the object of placing Canadian labor on a priority basis, so that every available man and woman will be made available for war industry or other essential work. Recently all unemployed men ranging in age from 17 to 70 years were required to register and statistics on these now are being compiled. Elliott M. Little, Director of National Selective Service, at a press conference here stated that the new regulations require job permits to be obtained for almost all forms of employment and provide compulsory channeling of job changes through employment offices.

The order, effective immediately, applies to men and women of all ages, and in principle extends over almost all occupations and age groups, the limitations previously applied to the employment of ablebodied men from 17 to 45 years in certain "restricted" occupations. "We have got to the stage where we must carefully measure our manpower on a priority basis, just as materials have to be rationed," Mr. Little stated. "This will ultimately lead to a rationing of labor by direction, not by compulsion."

Canada's May Exports A Record at \$234 Millions

Ottawo

• • • Canada's external trade has soared to an all time high record, with further expansion in this direction expected as the year advances. Trade Minister Mac-Kinnon reported exports for May at the all time record of \$234,180,-000, which is more than double that of immediate pre-war months. In May, 1939, Canada's export trade totalled \$94,000,000. While the nature of exports is not divulged in wartime, the large increase is the direct result of war materials exports which include aircraft, tanks, guns, munitions, etc., going to every battlefront in the world. Exports for April last were valued at \$169,390,000 and for May, 1941, at \$161,639,000.

Principal exports for the month of May were to Empire countries and totalled more than \$140,000,-

000 against \$91,611,000 for the same month last year, and were equal to more than a quarter of the entire 1939 export of \$428,232,328. Export trade with the United States also showed a marked increase in May, totaling \$67,940,000 compared with \$54,541,000 in May, 1941.

Largest increase for the month under review was to British India, at \$21,509,000 against \$3,391,000 in May, 1941; Exports to Egypt totalled \$17,696,000 against \$11,-130,000 a year ago; Newfoundland, \$4,765,000 against \$1,896,000; Australia, \$6,364,000 against \$3,600,000 and New Zealand, \$2,351,000 against \$988,000 a year ago. Exports to foreign countries in May totalled \$94,000,000 against \$70,000,000 last year, with particularly heavy increases to Russia of \$1,780,000 against nothing for May, 1941, and to China of \$1,654,000 compared with \$540,000 last year.

CONTINUOUS STRIVING PRODUCES

More Forgings

In T & W Forging Shops nothing is allowed to limit in any way the attainment of the utmost production of forgings in the shoriest possible period of time. T & W Engineers never cease striving to discover ways and means for stepping up the production of forgings. The entire organization is devoted to the maintenance of quality standards on forgings, that reduce your inspection time. T & W inspection checks on more things than



modern device and method for the inspection of forgings for aircraft and other war equipment. Avoid delay by using T & W Forgings.

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the specifications call for, and

T & W inspection utilizes every

Sales Offices: New York, Philadelphia, Chicago, Indianapolis, Detroit and Cleveland

PRP Sharply Alters Priorities System

• • • As predicted, the Production Requirements Plan in final operation will have a marked effect on the present priorities system. PRP is the basic material authorization to buy and supersedes all other priority instruments in the field it covers, but these other instruments will remain in effect for groups not covered by PRP, and preference ratings will still be used as directives of delivery on finished products.

With a few exceptions, PRP is mandatory for all concerns using \$5,000 worth of metal in a quarter and it may be used by other concerns. About 90 per cent of the metal used will be covered by the plan.

PRP requires that form PD-25-a be filled out by manufacturers as a specific application for *authority* to buy materials during the third quarter. The Requirements Committee of WPB will determine, with the aid of other branches, the general policy. Specific conditions

Additional copies of form PD-25-a may be obtained through THE IRON AGE, which has made arrangements with a stationer to supply copies at cost.

of a plant, however, will be considered. Form PD-25-a will then be returned to the applicant as an authority to buy the amounts of material approved on the form. The Requirements Committee determines how metals can best be distributed.

The Allocation Classification system, which will be started in the third quarter so as to become an effective part of PRP during the following quarter, also plays a definite part in the program. The present PD-25-a requires information on the end uses of the applicant's products, but often the applicant cannot determine the end uses, especially if he is a sub-con-

See pp. 33 to 35 of The Iron Age Priorites Guide, Sixth Edition, for the General Instructions and Allocation Classification Symbols. Specific Instructions, showing how to determine the classification of a given product, appeared in The Iron Age in three installments in issues of June 4, 11, and 18. If you cannot locate your copy of the Guide and the instructions, send 50c to The Iron Age, 100 East 42nd Street, New York, asking for a copy.

tractor. Also, even if the end use is known, there is no standard method of stating it on PD-25-a. The Allocation Classification system, designed to rectify this, is an end use code in numerical symbols. Numbers from 1.00 to 23.00 have been assigned to all major classes of military, industrial, and civilian uses, and these classifications are subdivided as necessary. In addition, there are Purchasers Symbols, such as USN for the Navy, USA for the Army, and LL for Lend-Lease. Priorities Regulation No. 10 requires that the code be used on orders placed after July 1, and on all previously placed orders calling for delivery after July 31.

Consequently, when applications are made under PRP for the fourth quarter, it will be possible for each manufacturer to state exactly, in terms of these codes, what proportion of his products will go into what particular end uses.

PRP grants authority to buy a



SULPHURIC OR CHROMIC ACID PROCESSES

If your war materiel contract calls for anodizing by either the chromic or sulphuric acid method, be sure to investigate the advantages of the Udylite-Mallory Rectoplater.

RECTOPLATERS ARE QUICKLY AVAILABLE. We can make prompt shipment.

A WIDE RANGE OF AMPERE-VOLT COMBINATIONS CAN BE SECURED. By grouping single Rectoplater units in series, practically any anodizing requirement can be filled. RECTOPLATERS HAVE HIGH CONVERTIBILITY VALUE. When the present need subsides, the Rectoplater anodizing set-up can be broken into individual units for such purposes as barrel and still tank plating, electrocleaning, etc.

We are equipped to design and supply complete anodizing installations. Udylite's experienced engineers will be glad to help you with your metal finishing problems.

THE UDYLITE CORPORATION 1651 E. Grand Blvd., Detroit, Mich.

Chicago

Long Island City N Y

Cleveland

definite amount of specific materials and authorizes a lump allowance for operating supplies. Actual shipments of critical materials now under allocation control will be governed from month to month through M orders. In effect, M orders continue just as before except for the substitute of the new Allocation Classification for various classifications now used. The most important function of the M orders will be in the specific scheduling of shipments.

A "kitty" or pool will be provided as a margin of safety to take care of errors in judgment or changes in the overall program. In addition, there will be set aside a percentage of the total supply of materials for the exempt classes of users, who will continue to use all the regular priority procedures in obtaining material supplies.

Applying and extending prefer-

For complete details concerning the simplified form of extending preference ratings, under the amended Priorities Regulation No. 3, see The Iron Age, June 18, page 110 and 111.

ence ratings will be uniform after July 1, in accordance with amended Priorities Regulation No. The amended regulation provides that any preference rating may be extended by suppliers and sub-suppliers on orders for materials which will be delivered to the person to whom the rating was originally assigned or physically incorporated in products to be so delivered. Companies not operating under PRP may also extend any rating to cover operating supplies such as small perishable tools, which will be consumed in processing material to fill the rated order. Up to 10 per cent of such operating supplies may be in the form of metals on the Metals List of Priority Regulations No. 11.

The P orders will eventually be greatly reduced in number. PD-1-a's may still be issued for capital equipment for all classes of producers and for all requirements of the industries not operating under PRP. A PD-1-a certificate may be used to obtain a finished item from a company covered by PRP, but the rating cannot be extended by such a producer to get necessary materials for manufacture since he will be required by the terms of PRP to obtain his basic materials

through the plan. When a rating assigned on PD-1-a is served on a manufacturer not under PRP, the rating can be extended for the necessary materials.

PD-3-a's will be used for military requirements in almost exactly the same way a PD-1-a is used. Officers of the Army and Navy will continued to assign the PD-3-a certificate for the delivery of finished items. The rating then serves as a directive of delivery.

But, if the manufacturer is operating under PRP, he cannot use PD-3-a to obtain materials for the production of the item by extending the rating. Instead, he will rely on PRP.

Project ratings, the P-19 series, will continue to be used for practically all building or construction activities with the usual exceptions of a limited amount of military construction and certain classes of housing.



Illustrated on this page are five important features of industrial truck design — features that mean high operating efficiency, low operating cost and the minimum of maintenance. Each was pioneered and perfected by Mercury and all five are incorporated in Mercury Industrial Trucks.

It is this excellence in design that has won for Mercury equipment the preference of leading industrial and transportation organizations throughout the country. A reputation of designing equipment that delivers the greatest number of productive hours at the lowest cost.

When the consideration of new industrial trucks arises in your plant it will pay you to have the complete story on Mercury equipment. Write for Bulletin 201-5.



TRACTORS
TRAILERS
LIFT TRUCKS

MERCURY

4144 S. Halsted St., Chicago, Illinois

Hydraulic Hoist: Requires no power to lower load. Less than 50% of usual number of moving parts. Complete overload protection.



Snap Action Cam Operated Controller: Eliminates injurious arcing.



Single Unit Motor and Drive Assembly: Double reduction spiral bevel and spur gears transmit maximum power. Semi-elliptic springs. External contracting brakes.



All Welded Frame: No rivet holes to weaken section. Smooth attractive exterior.



Trail Axle: Sturdy simple construction, wheels and steering knuckles ball bearing mounted.

Note: Features may vary slightly with type of truck but basic principle is retained.

Increase In Steel Wages Deemed Unlikely By Industry

Pittsburgh

• • • Industrialists here are already discounting an expected wage increase in the steel industry and a maintenance of membership in the so-called little steel case now before the War Labor Relations Board. A final report will be made this week by the threeman panel which was set up to establish the facts in the case. Public hearings before the board have been set for June 29.

Steel companies and the union have submitted their exceptions to the panel's preliminary report.

It is believed that the panel, in making its investigation, discarded as a factor the hourly wage rates paid by the four steel companies and concerned itself with the question of weekly steel wages as compared with weekly wages in other durable goods industries heavily loaded with overtime payments. As is generally known, overtime payments in the steel industry have not been substantial since the average work week is not much, if any over 40 hours a week.

The shortage of labor in recently established war industries has resulted in exceptionally high overtime payments whereas in the steel industry operations have been maintained at capacity for more than a year and as many employees as possible have been kept on the payroll by adhering to a 40-hr. week.

It is said that the WLRB panel inferentially found favor for a substantial wage increase asked for by the union on the basis of higher living costs and the average weekly wage of the steel workers. SWOC asked for a \$1 a day increase. It is further said that the maintenance of membership is also inferentially supported (in lieu of the union shop demand) by the WLRB panel. The panel does not make recommendations.

Any substantial wage increase in steel is a "hot potato" since the OPA is trying to keep prices and wages from going into an inflationary spiral. Steel wage increases, it is well known, when changed, directly affects hundreds of other companies which are not necessarily steel production concerns but which follow the action of the "bell-wether."



Henderson Cites Savings

• • • Opposition in Congress to the \$161,000,000 budget asked by OPA, brought statements by Administrator Leon Henderson June 20 that subsidy payments, and greater powers are necessary to maintain March price ceiling levels.

Seeking to prove that the budget request was modest. Henderson pointed to savings to the buying public and the government through price control. He said if prices of steel followed the same pattern in 1941 as in 1916, the additional cost of steel would have been \$200,000,000. The savings in copper due to price control amounted to \$230,000,000. Savings in munitions and construction based on the 1916 price rise pattern were more than \$6,000,000,-000, according to the OPA administrator. Henderson claimed that the \$130 billions war program would cost an additional \$62 billions if prices are permitted to rise at the same rate as during the World War I period.

Henderson pointed out that Britain has maintained a billion dollar subsidy fund, and that Canada has found subsidy powers an effective price control medium.

In addition to subsidy powers, Henderson indicated that effective wage stabilization, and heavy taxes to be deducted from current income payment are necessary adjuncts to control of inflation.



Small Lot Cadmium Sales

• • • • Small lot sales of metallic cadmium—going mostly to distributors or laboratories for experimental purposes—will be permitted at levels no higher than those at which the individual seller did

business during October, 1941, or the last date previous thereto on which a small lot sale was made. This is covered in Amendment No. 1 to price schedule No. 71 (primary and secondary cadmium).



Spiegeleisen Reaffirmed

• • • Domestic spiegeleisen, 19 to 21 per cent, has been reaffirmed for third quarter at \$36 per gross ton f.o.b. furnace. This price has prevailed since the first of July, 1940, at which time a market advance of \$4 was made effective.

As noted recently, prices on all other leading ferroalloys are unchanged, with ferromanganese having last been advanced to \$135 per gross ton, f.o.b. Atlantic seaboard and with prices at Rockdale or Rockwood, Tenn., and Birmingham, Ala., adjusted to the same maximum level.



Grain Magnesite Price Action

• • • To insure an adequate supply of maintenance grade deadburned grain magnesite for the Vanadium Corp. of America and the Mathieson Alkali Works, Inc., Price Administrator Henderson has granted permission to the Westvaco Chlorine Products Corp., to increase its selling price for this commodity to \$40.50 per ton in sales to these two consumers. The change in the maximum price, which applies only to these two customers and to shipments from Westvaco's Patterson, Cal., plant, was effected by amendment No. 2 to revised Price Schedule No. 75. The amendment becomes effective June 20.



Exempted from GMPR

• • • The prices which the War and Navy Departments receive for used, damaged and waste materials disposed of at public sale do not fall under the provisions of the General Maximum Price Regulation, Price Administrator Henderson ruled June 15. The exemption of these materials from maximum prices was made in Amendment No. 8 to Supplementary Regulation No. 1 of the General Maximum Price Regulation. The

amendment, effective June 15, has no applicability to the more important waste materials which are covered by individual price regulations.



Gas Heating Stoves

• • • Maximum prices at which the Samuel Stamping & Enameling Co., Chattanooga, Tenn., may sell two new stoves it manufactures exclusively for Sears, Roebuck & Co., Chicago, are established in order No. 7 under revised Price Schedule No. 64 (domestic cooking and heating stoves).



Leaded Zinc Oxides

• • • • The ceiling price for leaded zinc oxides containing 35 per cent or more lead, which was reduced \(^1\)/4c. per lb. by the general maximum price regulation, has been returned to the April 1, 1942, level of 7c. per lb. This price, which corrects an OPA omission, became effective June 22.



General Maximum Ceiling

• • • The effective date of the general maximum price regulation as it applies to transportation, storage, and related services has been postponed to July 1, Price Administrator Leon Henderson announced June 17.



Aluminum Scrap Prices

• • • At a meeting of the Aluminum Research Institute in New York City, industry representatives stated that scrap dealers had been offering scrap on an "as is" basis at OPA prices for standard grades. The institute voted that purchases on an "as is" basis were a violation of the spirit of the schedule. An OPA announcement June 16 fortified the institute position. OPA said buying or selling on an "as is" basis involves a rough estimate of the percentage of foreign matter in the scrap and brings danger of violation of the schedule. If the estimate is low, and the proper deduction is not made for the actual contamination, the price paid will be above the permitted maximum, and penalties will be incurred.



Nickel Steel Scrap Prices

• • • Amendment No. 6 to Iron and Steel Scrap Price Schedule No. 4 brings nickel steel scrap under the iron and steel schedule. The action is taken on the premise that the base of nickel steel scrap is more nearly steel than nickel, and the problems of pricing are allied with the ferrous scrap collection industry. The scrap was formerly under the nickel scrap schedule No. 8.



Lend-Lease Sales Prices

• • • Sales of goods and commodities to such agencies as the Lend-Lease Administration, British Purchesing Commission and British Air Commission are, in general, domestic sales subject either to specific domestic price schedules or regulations or to the General Maximum Price Regulation, Price Administrator Henderson reminded June 16.

In general, he added, they are subject to such schedules and regulations rather than the Maximum Export Price Regulation.

"In all cases in which an agency such as the Lend-Lease Administration, the procurement agencies of the Treasury, or the British Purchasing Commission buys material f.o.b. or f.a.s., and takes title and all responsibility for the material at the factory door or on the shipping dock, the seller performs no exporting function and the sale is a domestic and not an export sale," the Price Administrator explained.

"A sale for export, or to an agency which intends to export, is not an export sale as defined in the Maximum Export Price Regulation.

"In some cases, certain special export expenses are incurred, even on such sales," he added. "For example, certain products must be specially packed or tinned when they are destined for export, and special packing charges are incurred by the manufacturer who is selling f.o.b. to an exporting agency. However, such extra ex-

penses are allowable only insofar as they are permitted under the applicable domestic price schedule or regulation.

"Some manufacturing concerns with both domestic and export departments have been handling Lend-Lease sales through their export departments. Despite this fact, except in cases where the British Purchasing Commission or a similar agency acts as agent for a foreign purchaser rather than as a principal, such sales are, under the price regulations, domestic sales rather than export sales covered by the Maximum Export Price Regulation."



Pig Tin Prices

• • • Amendment 2 to Revised Price Schedule 17 effects minor changes in pig tin prices. Purpose was to establish prices for small shapes and sizes for convenience of buyers who use tin to change tin content in solders or vice versa. Amendment also provides price for low grade Bolivian tin not previously specifically covered in the schedule.



Tool Steel Scrap Prices

• • • A maximum price for a type of chrome-vanadium-steel scrap sold by the Tennessee Coal, Iron & Railroad Co.—a high-speed tool steel scrap similar to the "molybdenum type," but differing in alloy content—has been established.

The maximum was established in Order No. 8 under the General Maximum Price Regulation and became effective June 9, 1942.

As this particular type of scrap was not sold by any company during March, 1942, a maximum price could not be set under Section 2 of the General Maximum Price Regulation, Mr. Henderson stated.

After computing the value of the principal alloying materials, with the exception of steel, the method used by the trade in arriving at the value of such scrap, maximum prices of \$51.52 per long ton, f.o.b. mill for the solid grade and \$44.04 for the turnings and borings grade were established, the Price Administrator announced.

The scrap contains 8 to 10 per

cent chrome, 1.20 to 1.30 per cent molybdenum, 0.65 to 0.75 per cent vanadium, small percentages of carbon, manganese, sulphur, phosphorus and silicon, and the remainder steel.

1

Washington

• • • The Leonard & Baker Stove Co., Taunton, Mass., has been authorized by OPA to sell its new coal and gas combination Model 1906 at \$101.08, subject to discounts, allowances and terms no less favorable than those in effect for Model No. 1904, now discontinued, for which OPA previously had fixed the same figure. The new stove was in process of manufacture on Dec. 21, 1941, and hence was excepted from the provisions of the schedule which restrict changes in specifications on or after Jan. 5, 1942.



Steel Castings

• • • Effective June 25, foundries may apply for permission to charge buyers of steel castings the abnormal freight costs on shipments of castings directly related to the war efforts if such costs are occasioned by unusual circumstances such as deliveries beyond the normal shipping area. This permission was granted by OPA on Monday by an amendment to Price Schedule No. 41. The schedule also was amended to permit the Price Administrator

to allow foundries to adjust their prices on deliveries made during the period that OPA is considering their application. Previously adjustable pricing was permissible only on contracts for steel castings where delivery was not required until six months or more after the date of the contract.



Washington

• • • Warning was given last week by Price Administrator Leon Henderson that persons who buy and sell aluminum scrap on an "as is" basis are running the risk of making themselves liable to the heavy penalties provided for violation of Revised Price Schedule No. 2 on aluminum scrap. It was pointed out by Mr. Henderson that the schedule specifically provides that maximum prices may be charged and paid only for scrap which meets generally accepted standards of the trade. Violators of the schedule face suspension or revocation of license to buy or sell scrap, and are subject to criminal penalties, civil enforcement actions and suits for treble damages provided for in the Emergency Price Control Act of 1942.

"Low-grade scrap, scrap which is not clean and dry, and scrap which for any other reason fails to meet trade standards must be sold at prices proportionately below the established maximum prices," Mr. Henderson explained. "Proper deductions must be made for oil, water and other contam-

ination contained in borings, turnings and similar machinings.

"Buying or selling on an 'as is' basis," he continued, "involves a rough estimate of the percentage of foreign matter in the scrap and brings danger of violation of the schedule. If the estimate is low, and the proper deduction is not made for the actual contamination, the price paid will be above the permitted maximum, and penalties will be incurred.

"The safe and proper way to buy and sell aluminum scrap," the Price Administrator added, "is to agree upon a price for a given lot only on a 'clean and dry' basis, so that the payment will be confined to the actual clean scrap content, to be determined by analysis or other method established in the trade."



Relief for Steel Foundries

• • • Under an amendment issued Tuesday by OPA to the price schedule covering steel castings, abnormal transportation costs may be passed on to the consumer.

The revision, effective June 25, allows the seller to charge more than ceiling prices in cases where he would otherwise be forced to absorb abnormally high transportation costs resulting from dislocated tonnage shipments needed for emergency requirements of the war effort. Data supporting the seller's need for relief must be submitted to OPA.

SHIP'S PLANE CATAPULT: This long, bridge-like construction is an airplane catapult used in launching planes into the air from the decks of Naval vessels. It was built recently by the Bartlett Hayward Division of Koppers Co., in an eastern plant.



WPB Amends PRP Exempting Mills That Do Not Make Finished Parts

Washington

• • • Amendment No. 1 to Priorities Regulation No. 11, partially excludes operations of metal mills from the use of PRP. The amendment exempts from PRP mills that, "purchase metals in the forms described in PRP metals list and process or alloy the metal into other forms also described in the list, but do not manufacture it into finished parts or products."

Originally, regulation No. 11 required any company which uses in a calendar quarter more than \$5000 worth of metals in the forms described in an accompanying metals list to operate under PRP. This was intended primarily to apply to companies which buy metals in such forms for processing into finished parts or products.

It still is necessary for metal mills to obtain maintenance and repair material under PRP and to use PRP as their application for priority assistance to obtain any metal which they process into forms not included in the metals list which accompanies the regulation, if their total purchases of metals amount to more than \$5000 in a quarter.

Regulation No. 11 as originally issued prohibited a duplication of purchase orders by a company operating under PRP, which would add up to more than the total quantity of material which the company was authorized to receive by its PD-25-a certificate. If purchase orders had already been issued for more than the authorized quantity of material before the PD-25-a certificate was received, the company was required to cancel the excess. The amendment provides that if such cancellation of a purchase order for metal during the third quarter of 1942 would disrupt the schedules of a metal producer, and if the producer certifies this to be a fact in writing, the delivery may be made in accordance with the purchase order, and to that extent,

the restrictions of Priorities Regulation No. 11 do not apply.



Exports and Imports

Branch has been established by WPB, the chief function of which will be to obtain a more complete picture of foreign non-military requirements and relate them to the broad policy of distribution of materials to be established by the WPB Requirements Committee. Formation of the branch constitutes a further step toward bringing total demand to which priority assistance can be granted, into line with available supplies of scarce materials and products.



Aircraft Ratings

• • • Preference rating orders P-109 and P-109-a, which expire June 30, were amended to permit suppliers who are not required by the terms of Priorities Regulation No. 11 to come under PRP to extend ratings for the purpose of filling purchase orders even after the orders have expired. P-109 was assigned A-1-a ratings to production of military and naval tactical types of aircraft and P-109-a has assigned A-1-b rating to producers of trainer types.



Railroad Material Ratings

• • • Railroads have been given a life by the WPB, by an order assigning an A-1-j prerating for deliveries of materials, essential for repair and maintenance of track, structures, signal and communication systems, cars and locomotives and other important operating equipment. Previously the rating was A-3. The new order, amendment No. 1 to P-88, also specifies that ratings may be ap-

plied without further authority for installations in which the charge to capital account is not in excess of \$500 for a single project.

Another provision of the amendment prohibits the application of a higher rating than A-1-j by suppliers to replenish inventories depleted as a result of deliveries made on A-1-a orders for emergency repairs.

The amendment makes other minor changes in the original order, including a provision that railroads may not only sell material to their own subsidiaries, but also to lines not owned but customarily maintained by them or their subsidiaries.



Auto Valve Heads

L-128, issued June 17 and designed to conserve chromium and nickel, specifies the amount of these metals that may be used in the manufacturing formula for automotive exhaust valves.

Under the order, all manufacturers must use a two-piece, welded head type of construction, using chromium and nickel in the valve head only.

WPB said that although it is unlikely that any additional chromium or nickel will be made available to manufacturers of exhaust valves for civilian use, issuance of the order is regarded as necessary in attempting to achieve conservation in the manufacture of valves that may be possible without allocations of the two critical metals.



Water Meters

• • • Schedule I to limitation order L-154 completely bars the use of stainless steel or nickel alloys in the manufacture of water meters, prohibits the use of tin except as an alloy in copper, and eliminates copper and copper base alloy use in all parts of the meter except internal gears and workings.

The schedule was issued con-

currently with order L-154, which empowers WPB to issue from time to time, schedules restricting the use of critical materials in the production of any power, steam, and water auxiliary equip-

Schedules similar to the one on water meters are expected to be issued later in respect to other auxiliary equipment. Major equipment, such as boilers and turbines, are not included in L-154 because they are controlled under a previous order, L-117.



Alloy Scrap Segregation

• • • To aid in the production of alloy steel, particularly the NE steels, WPB has made it mandatory that mills and fabricators carefully segregate all alloy steel scrap. The order, M-24-c, sets up classifications of alloy steels, provides for scrap segregation by classification, and prohibits mingling of segregated alloy scrap except in the melting process. Savings are expected in nickel, chromium, tungsten, and molybdenum as a result of the order.

While many steel mills have long practiced alloy scrap segregation, it was pointed out that fabricators have not. High per centages of nickel, tungsten, and molybdenum in scrap are recoverable. Chromium can be recovered in electric furnaces and to a limited extent in open hearths. Thus, scrap segregation will permit the flow of scrap into channels where it will do the most good.

The order sets up 18 classifications. The first nine are alloy constructional steels; 10, 11, and 12 are high speed tool steels; 13 to 17 are corrosion and heat resistant alloys containing chromium and nickel; and 18 is all other heat resisting steels.



Ethyl Cellulose

• • • Complete allocation of ethyl cellulose was established by WPB through order M-175, an action found necessary to provide adequate supplies for military and essential civilian uses. Except for deliveries of 50 lb. by any one person to another in one month, no deliveries or acceptances of ethyl cellulose may be made except on WPB authorization. Orders for more than 50 lb. must be filed with producers on or before the 15th of the month preceding that in which delivery is desired, accompanied by form PD-550. Producers must file with WPB before the 20th of each month, beginning with June. form PD-540, showing a delivery schedule and a statement of the amount available for delivery in the succeeding month.



Nickel Scrap

• • • Nickel scrap order M-6-c was amended to make it conform to the new alloy steel scrap segregation order, M-24-c. Changes in M-6-c brought about by the amendment are:

1. Nickel scrap covered by M-6-c is rrap containing 1 per cent nickel or over, istead of 0.50 per cent as originally

specified.

2. Nickel scrap under M-6-c does not include metal the principal part of which is aluminum, nor metal containing over 40 per cent copper. These alloys are covered by order M-1-d and M-9-b respec-

ered by order M-1-d and M-9-b respectively.

3. Ferrous nickel scrap must be segregated in the same manner as provided in M-24-c covering alloy steel scrap.

4. The provision in the original order limiting the amount of scrap melted in any month to 300 lb. nickel-content is removed.

5. Any melter may receive nickel scrap that he requires to fill orders bearing ratings higher than A-2 without regard to primary nickel which may have been allocated to him in conformity with the original order.

original order.
6. Dealers must not melt nickel scrawwithout specific authorization of the Director of Industry operations.



Cadmium

• • • Cadmium use will be restricted to essential military and civilian uses by an amendment to order M-65, on and after June 24. The order provides that cadmium may be delivered to distributors and to users only upon specific authorization of WPB, obtainable by filing form PD-441.

Lukens Open Hearth Strikers Return to Work

• • • Sitdown strikers who stopped production in the open hearth Department of Lukens Steel Co., on June 18 went back to work two days later at the request of NWLB. The strike started when 75 men walked out to enforce demands for a 20 per cent wage increase.

In this dispute, as in the four-day walkout in the Lukenweld Division the previous week, management asserted its willingness to negotiate once the men returned to work. Although CIO disclaimed responsibility for the strike, all sitdowners returned to work shortly after being ordered to do so by the union.

QUEER NAZI PLANE: Described as "the new, unsymmetric airplane of the German Air Force, the BV 141," by Nazi sources, this plane is reported to be under mass production at the Blohm and Voss shipyards. The observation turret is in one wing and the engine in the other, with the fuselage directly behind the engine, but not midway between the wing tips. Also, the plane has a peculiar unbalanced tail assembly.



This Week's Priorities And Prices

Fluorspar, glass grade, sold by Fluorspar Processing Co., Colorado Springs, Colo., is ceilinged at \$27.40 a ton,

f.o.b. Salida, Colo., by order 1 to price regulation 126, effective June 9. (OPA-T2)

Metal mills operators are partially excluded from the use of PRP by amendment 1 to priorities regulation No. 11, issued June 9. (WPB1373)

Canada oil operators are placed on same footing as U. S. operators as far as priority assistance is con-cerned by amendment 1 to order P-98, issued June 19. (WPB1377)

Aluminum tonnages collected last year in the National Aluminum Collection Campaign are made public, June 19. (WPB1378) PRP release T-482, was corrected to include a line that

was omitted from bottom of page 2. (WPB1379)

Rubber and rubber goods may be imported only by RFC agents according to amendment 10 to order M-15-b, effective June 19. (WPB-T486)

Nickel scrap order M-6-c was amended June 19 to con-form to new alloy steel scrap segregation order

M-24-c. (WPB-T488)
Asbestos order M-79 was amended June 18 changing circumstances under which imported South African amosite asbestos may be used. (WPB-T489) Leaded zinc oxide prices were increased to April 1 level

of 7c. by maximum price regulation 166, effective June 22. (OPA24)

Alloy steel scrap ordered segregated to conserve alloy-ing materials by order M-24-c issued June 17. (WPB1362)

Cadmium use was further restricted by order M-65, as amended, effective June 24. (WPB-T478)

Metals used in water meters was curbed by schedule I to order L-154, issued June 17. (WPB-T479)

Aircraft orders, P-109 and P-109-a, were amended to permit suppliers not under PRP to extend ratings for filling orders rated under P-109 and P-109-a, even after June 30 when orders expire. (WPB-T-480)

Ethyl cellulose is placed under complete allocation control by M-175, issued June 18. (WPB-T481)

Railroads were given higher ratings by amendment 1 to order P-88, issued June 17, for deliveries of repair and maintenance materials. (WPB-T483)

Pig tin, by amendment 2 to price schedule 17, effective June 22, produced by the electrolytic process may be sold at a price equal to that of top grade tin. (OPA13)

Tin order M-43 was amended June 17 to include in the order itself the amendments issued since the original issuance date of the order and removes obsolete provisions. (WPB-T473)

Exhaust valve specifications limiting nickel and chromium use are set up in order L-128 effective July 1. (WPB-T476)

Magnesite, maintenance grade dead-burned, price has been increased to \$40.50 per ton in sales by the Westvaco Chlorine Products Corp., to the Vanadium Corp. of America and the Mathieson Alkali Works,

Inc., by amendment 2 to revised price schedule 75, effective June 20. (OPA53)

Importers are permitted by supplementary regulation 12 to the general maximum price ceiling to sell imported commodities under certain conditions to industrial and commercial users at prices above those paid in March. (OPA56)

Copper and brass use in certain civilian products was further restricted by amendment 2 to order M-9-c, issued June 17. (WPB1380)

Refrigerator and air conditioning equipment manufac-turers are afforded some degree of relief from order L-38 by amendment 1, issued June 18. (WPB-T492)

Elastic fabric use is limited to military and essential health products by order M-174, effective June 24. (WPB-T494)

For copies of above announcements address Division of Information, WPB (or OPA), Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 means announcement 600 issued by the War Production Board.)

Revisions to The Iron Age Priorities Guide

● ● The following data, together with all intermediate weekly revisions in THE IRON AGE, should be added to THE IRON AGE Priorities Guide published with the issue of June 4 to bring the Guido up to date.

Under "M Orders," page 6, add:

M-6-c...Amended order (6-19-42) to conform to new alloy steel scrap segregation order, M-24-c. Requires segregation of scrap of more than 1 per cent nickel, and other provisions.

M-9-c...Amendment No. 2 (6-17-42) eases restrictions on use of copper and brass for certain commodities, and other provisions.

M-15-b...Amendment No. 10 (6-19-42) prohibits importation of rubber and rubber products including balata except by subsidiaries of RFC.

M-24-c...Sets up classifications for scrap alloy steels, provides for alloy steel scrap segregation, and prohibits mingling of segregated scrap except in melting process (6-17-42).

M-65...Amended (6-17-42) providing for allocation of cadmium. Related form; PD-441.

M-79...Amended (6-18-42) to restrict use of amosite asbestos, 85 per cent magnesia pipe coverings, and to ease inventory restrictions. Waste or scrap from processing may be disposed of when unsuitable for processing under terms of order. Related forms: PD-551 and PD-252.

M-174...Limits use of elastic fabric to military and essential health articles, effective June 24 (6-24-42).

M-175...Places ethyl cellulose under complete allocation (6-18-42). Related forms: PD-549 and PD-550.

Related forms: PD-549 and PD-550.

Related forms: PD-549 and PD-550.

P-88...Amendment No. 1 (6-17-42) assigns ratings from A-1-a to 1 for deliveries of materials assigns ratings from A-1-a to 1 for deliveries of materials assigns ratings from A-1-a to 1 for deliveries of materials assigns ratings from A-1-a to 1 for deliveries of materials assigns ratings from A-1-a to 1 for deliveries of materials assigns ratings from A-1-a to 1 for deliveries of materials assigns ratings from A-1-a to 1 for deliveries of materials assigns ratings from A-1-a to 1 for deliveries of materials to the Canadian assigns and

visions.

P-98...Amendment No. 1 (6-19-42) assigns ratings from A-1-a to A-10 for deliveries of materials to Canadian petroleum operators.

P-109...Amendment No. 2 (6-17-42) permits suppliers not under PRP to extend ratings for filling purchase orders of producers rated under order, even after orders have expired, and assigns A-1-a rating to production of military and naval tactical types of aircraft.

P-109-a...Amendment No. 1 (6-17-42) permits suppliers not under PRP to extend ratings for filling purchase orders of producers rated under order, even after orders have expired, and assigns A-1-b ratings to producers of trainer type aircraft.
Under "L Orders," page 19, add:
L-38...Amendment No 1 (6-18-42) eases restrictions on sale of certain items of industrial and commercial refrigerator and air conditioning equipment. Related form: PD-520, PD-1-a.
L-41...Amendment No. 2 (6-17-42) permits use of rubber for purposes detailed in order M-15-b and permits use of synthetic plastics in hazard-measuring devices.
L-128...Sets up rigid specifications for manufacture of exhaust valves for automotive equipment, limiting use of chromium and nickel (6-17-42).
L-154...Empowers WPB to issue schedules restricting use of criti-

valves for automotive equipment, limiting use of chromium and nickel (6-17-42).

L-154... Empowers WPB to issue schedules restricting use of critical material in production of power, steam, and water auxiliary equipment (6-18-42).

L-154... Schedule I (6-18-42) bans use of stainless steel or nickel alloys, tin except as copper alloy, and copper alloys except as internal gears and workings in water meters.

Under "Priority Regulations," page 33, add:

No. 11... Amendment No. 1 (6-19-42) excepts metal mill materials processed by it to produce metals in any forms listed in PRP Metals List, and other provisions.

No. 11... Correction (6-19-42) permits companies not under PRP to extend any rating to cover operating supplies which will be consumed in processing material to fill the rated order, up to 10 per cent of the cost of the material processed, provided that no more than 25 per cent is in form of metals on Metals List of regulation.

Under "E Orders," page 32, add:

of regulation.

Under "E Orders," page 32, add:

E-1-b...Interpretation No. 2 (6-22-42) rules that AA ratings cannot be sought for expediting machine tool deliveries to service purchasers

Provides blanket A-1-a to Canadian purchasers grouped in ther purchasers" class, giving them same rating that "for-in purchasers" now have.

Symbols of Products Manufactured Under PRP

• • • Following is an alphabetical list of various manufactured products and industries and the Allocation Classification symbol applicable to each product. These symbols correspond to the symbols as set up under Priorities Regulation No. 10, and shown on page 35 of THE IRON AGE Priorities Guide, Sixth Edition, published with the June 4 issue of the magazine.

These symbols must appear on all orders placed after July 1 for materials by manufacturers operating under the Production Requirements Plan. Also, they must appear on all previously placed orders that will be delivered after July 31.

July 31.	
-A-	
Abdominal supports, manufacture of	12.20
Abrasive points, wheels, discs for dental use, manufacture of	12.20
Abrasive stones, wheels, paper, cloth,	
and related products, manufacture of.	22.00
Acetone, manufacture of	8.20
Acids, manufacture of	8.20
Adding machines, manufacture of	19.00
Addressing machines, manufacture of	
Agricultural machinery, manufacture of	13.00
Air compressors, manufacture of	
Transmit customer's sy	mbol
Aircraft and aircraft parts (except mili-	
tary), manufacture of	10.50
Air heaters, electric, manufacture of	16.00
Airlane markers, manufacture of	10.50
Airlines, operation of Airport construction (except buildings) Alloying, rolling, and drawing of metals	10.50
Airport construction (except buildings)	10.50
Alloying, rolling, and drawing of metals	8.10
Aluminum alloving, rolling, and draw-	
ing	8.10
Aluminum plants. operation of	8.10
Aluminum plants. operation of	
facture of	12.20
Aluminum ware for household use, man-	
ufacture of	16.00
Ammunition for private use, manufac-	
ture of	18.00
Amusement-park equipment, manufac-	
ture and operation of	18.00
Anesthesia apparatus, manufacture of	12.20
Anthropometrical, astronomical, chemi-	
cal, physical, and physiological apparatus, manufacture of	12.20
Apartment houses, construction of Artificial leather, manufacture of 'Artificial limbs, manufacture of Artists' materials, manufacture of Ashats manufacture of Asparagus knives, manufacture of Asparagus knives, manufacture of Ashat production of	21.20
Artificial leather manufacture of	8.90
Artificial limbs manufacture of	12.20
Artists' materials manufacture of	23.00
Ashestos mining and processing of	8.90
Asparagus knives manufacture of	13.00
Ash travs manufacture of	23.00
Asphalt, production of	8.90
Asphalt, production of	10.20
Automobile bodies, manufacture of	10.20
Automobile brakes and brake parts,	
manufacture of	10.20
Automobile parts and accessories, manu-	
facture of	10.20
Automobile radios, manufacture of	16.00
	10.20
Automotive electrical equipment, manu-	
facture of	10.20
facture of	
ufacture of	10.20
Auto repair shops, operation of	10.20
—B—	
Baby carriages, manufacture of Badges and tags, manufacture of	16.00
Radges and tage manufacture of	23.00
Bale ties, manufacture of	22.00
Bake ovens for commercial use manu-	22.00
Bale ties, manufacture of Bake ovens for commercial use, manufacture of Baking machinery, manufacture of	20.20
Baking machinery, manufacture of	20.20
baking powder, yeast, and leavening	
compounds manufacture of	14.00
Balancing machines (metal-working), manufacture of Barber chairs, manufacture of Barbers' clippers, manufacture of	
manufacture of	20.10
Barber chairs, manufacture of	12.20
Barbers' clippers, manufacture of	12.20
Barber-shop equipment, manufacture of	12.20

I DDD	
nder PRP	
Barges, building and repair of	10.40
Earn-door hangers and track, manufac-	13.00
Earn-door hangers and track, manufac- ture of	13.00
Barometers, manufacture of	21.90 23.00
Barrels, drums, and kegs, manufacture ofTransmit customer's sy	
Baskets for fruit and vegetables, manu-	mbol
facture of	13.00
Baskets for fruit and vegetables, manufacture of Bathroom, kitchen, and baby scales, manufacture of Batteries, storage and primary, manufacture of	16.00
Batteries, storage and primary, manufacture of Transmit customer's sy	mhol
Batting, padding, and wadding, manu-	
facture of	8.90
ture or	20.20
Bearings, all types, manufacture of Transmit customer's sy	mbol
Beauty-shop equipment, manufacture of	12.20
Beet drills, manufacture of	13.00
Beet lifters, manufacture of	13.00
Beakeyesnop equipment, manufacture of Beekeepers' supplies, manufacture of. Beet drills, manufacture of Beet lifters, manufacture of Beet sugar, manufacture of Beet-sugar, machinery, manufacture of Beet-sugar, machinery, manufacture of Bending machinery, manufacture of	20.20
Rievela motore and accessories manufac	20.10
Bicycles, manufacture of Bisuits, crackers, and pretzels, manufacture of	10.90
Bis uits, crackers, and pretzels, manu-	10.30
facture of Bits (drill), manufacture of Blackboards and slates, manufacture of Blast-furnace products, manufacture of Blast-furnace products, manufacture of	22.00
Blackboards and slates, manufacture of	17.20
	22.00
Blueprinting	17.10
	8.20 10.40
Bolts, nuts, and washers, manufacture of	mhol
Bone black, carbon black and lamp	0.00
Boning and skinning knives, manufac-	8.20
Boning and skinning knives, manufac- ture of	13.00 17.10
bookbinding machinery, manufacture of	20.20
Books, printing and publishing of Boot and shoe bindings, manufacture of	17.10 8.90
Boot and shoe bindings, manufacture of Bottle-making machinery, manufacture of	
Bottling machinery, manufacture of	20.20 20.20
Bottling machinery, manufacture of Box-making machinery, manufacture of Braces (for personal use), manufacture	20.20
of	12.20
Bread and other bakery products, manu-	8.10
facture of Brewhouse machinery, manufacture of.	$\frac{14.00}{20.20}$
Brick and hollow structural tile, manu-	0.00
Brick and hollow structural tile, manufacture of Brick carriers, manufacture of Bridges, highway, construction of	8.90 22.00
Bridges, highway, construction of Broaching machines, manufacture of	10.30 20.10
Broadcast seeders, manufacture of Broadcast seeders, manufacture of Brooders, manufacture of	13.00
Broom racks, manufacture of	16.00
Brooms, manufacture of	16.00
Buckles for clothing, manufacturing of Building maintenance and repair	15.00
Building stone, manufacture of	8.90
Bulldozers, manufacture of	20.20
Buoys, manufacture of Burglar alarm and hold-up apparatus, manufacture of	12.30
burrs and drills for dental use, manu-	
facture of	$12.20 \\ 10.20$
Busses, manufacture of	15.00
Butter-making and butter-working ma- chinery, manufacture of	11.90
chinery, manufacture of	20.20
Cabinets and cases for barber and	
Cabinets and cases for barber and beauty shops, manufacture of	12.20
Cable companies (telegraph), operation of	11.30
of Cable splicers, manufacture of Calculating machines, manufacture of.	22.00
Calendars, manufacture of	19.00
Calf weaners, manufacture of	18.00
Campnor, manufacture of	8.20
Canals, construction and operation of Candles, manufacture of	10.40 23.00
Candy and other confectionery products	
manufacture of	14.00
Cane sugar, manufacture of	14.00
Cane-sugar machinery, manufacture of	20.20

Canning and drying of fruits and vege- tables, including soup	14.00
Canning machinery, manufacture of	20.20
Canning of fish, crustacea, and mollusks	14.00
Canoes, manufacture of	10.40
Can openers, manufacture of	16.00
Carbon paper, manufacture of	19.00
Carbon products for electrical industry,	
manufacture of .Transmit customer's sy	mbol
Carburetors, manufacture of	
Transmit customer's sy Carding (textile) machinery, manufac-	mbol
Carding (textile) machinery, manufac-	
Carning (textue) machinery, manufacture of	20.20
Carnival equipment, manufacture and	
operation of	18.00
Carpenters' tools, manufacture of	22.00
Carpets, rugs, and mats, manufacture	
of	16.00
Carriages and other horse-drawn ve-	
Carpets, rugs, and mats, manufacture of carriages and other horse-drawn vehicles, manufacture of	10.90
Cars and car machinery for industrial	
and maining tree (except sutes) month	
facture of	20.20
Cash registers manufacture of	19.00
Caskets coffins burial goods, and other	20100
and mining use (except autos), manufacture of	23,00
Cost iron pine and fittings manufacture	20,00
Castaron pipe and nicings, manufacture	8.10
of	8.10
Castings, metal, manufacture of	13.00
Cattle denorners, manufacture of	19.00
Ceiling fans, manufacture of	8.20
Celliphane, manufacture of Cellophane, manufacture of Cement, manufacture of Cement mixers, manufacture of Cereal preparations, manufacture of Cereal preparations, manufacture of Cereal preparations, manufacture of Cereal preparations, and Cereal	8.20
Cement, manufacture of	8.90
Cement mixers, manufacture of	20.20
Cereal preparations, manufacture of	14.00
Check-writing machines, manufacture of Cheese, manufacture of Chewing gum, manufacture of	19.00
Cheese, manufacture of	14.00
Chewing gum, manufacture of	14.00
Children's and infants' wear, manufac-	
ture of	15.00
Children's vehicles (except bicycles and	
haby carriages), manufacture of	i8.00
Children's and infants wear, manufac- ture of	16.00
Chisels manufacture of	22.00
Chisels, manufacture of	8.20
Chocolete and cocos products manufac-	0.00
turn of	14.00
ture of	14.00
Cider mills and fruit pressers (farm), manufacture of Cigarettes, manufacture of Cigars, manufacture of	13.00
manufacture of	14.00
Cigarettes, manufacture of	14.00
Cigars, manufacture of	14.00
	00.00
ture of	23.00
ture of	
operation of	18.00
Civilian barracks, construction of new	
Civilian barracks, construction of new buildings	21.20
Civilian barracks, construction of new buildings	21.20
Civilian barracks, construction of new buildings Clay-working machinery, manufacture of	21.20 20.20
Civilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations,	21.20 20.20
Civilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of	21.20 20.20 22.00
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Civilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing manufacture of	21.20 20.20 22.00 23.00 16.00 15.00
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Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing, manufacture of Clubs, construction of new buildings Coal, mining, storage, and distribution of Coal-tar products, crude and intermedi-	9.30
Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing, manufacture of Clubs, construction of new buildings Coal, mining, storage, and distribution of Coal-tar products, crude and intermediate, manufacture of	9.30 8.20
Clylian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing, manufacture of Clubs, construction of new buildings Coal, mining, storage, and distribution of Coal-tar products, crude and intermediate, manufacture of	9.30 8.20
Clylian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing, manufacture of Clubs, construction of new buildings Coal, mining, storage, and distribution of Coal-tar products, crude and intermediate, manufacture of	9.30 8.20
Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing, manufacture of Clubs, construction of new buildings Coal, mining, storage, and distribution of Coal-tar products, crude and intermediate, manufacture of Coffee-grinding machinery, manufacture of Coffee pots, manufacture of	9.30 8.20
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Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of	9.30 8.20 20.20 16.00 20.20
Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of	9.30 8.20 20.20 16.00 20.20
Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of	9.30 8.20 20.20 16.00 20.20
Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of	9.30 8.20 20.20 16.00 20.20 19.00
Civilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing, manufacture of Clothing, manufacture of Clothing, manufacture of Coal-ting, manufacture of Coal-tar products, crude and intermediate, manufacture of Coffee-grinding machinery, manufacture of Coffee pots, manufacture of Coffee-roasting machinery, manufacture of Coin-operated weight and amusement machines, manufacture of Coke, production, storage, and distribu-	9.30 8.20 20.20 16.00 20.20 19.00
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Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing, manufacture of Clothing, manufacture of Coal, mining, storage, and distribution of Coal-tar products, crude and intermediate, manufacture of Coffee-grinding machinery, manufacture of Coffee-roasting machinery, manufacture of Coffee-roasting machinery, manufacture of Coin counters, manufacture of	9.30 8.20 20.20 16.00 20.20 19.00 18.00 9.30
Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of control of manufacture of clocks, watches, materials, and parts, manufacture of clothes racks, manufacture of clothing, manufacture of clothing, manufacture of clothing, manufacture of cold, mining, storage, and distribution of coal-tar products, crude and intermediate, manufacture of coffee-grinding machinery, manufacture of coffee-roasting machinery, manufacture of control counters, manufacture of coin counters, manufacture of coid-rolled steel sheets and strip and cold-finished steel bars, manufacture of	9.30 8.20 20.20 16.00 20.20 19.00 18.00 9.30
Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of control of manufacture of clocks, watches, materials, and parts, manufacture of clothes racks, manufacture of clothing, manufacture of clothing, manufacture of clothing, manufacture of cold, mining, storage, and distribution of coal-tar products, crude and intermediate, manufacture of coffee-grinding machinery, manufacture of coffee-roasting machinery, manufacture of control counters, manufacture of coin counters, manufacture of coid-rolled steel sheets and strip and cold-finished steel bars, manufacture of	9.30 8.20 20.20 16.00 20.20 19.00 18.00 9.30
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Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of	9.30 8.20 20.20 16.00 20.20 19.00 18.00 9.30 8.10 ymbol
Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of	9.30 8.20 20.20 16.00 20.20 19.00 18.00 9.30 8.10 ymbol
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Civilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clother racks, manufacture of Clother racks, manufacture of Clothing, manufacture of coal. thing, construction of new buildings coal, mining, storage, and distribution of coal-tar products, crude and intermediate, manufacture of Coffee-grinding machinery, manufacture of Coffee-grinding machinery, manufacture of coin-operated weight and amusement machines, manufacture of Cocke, production, storage, and distribution of Cold-rolled steel sheets and strip and cold-finished steel bars, manufacture of Collapsible tubes, manufacture of Transmit customer's s: Colleges, universities, and education institutions Colors and pigments, manufacture of Combines, manufacture of Combines, manufacture of Combines, manufacture of Combing machinery (textile), manufacture of Commercial laundry dry pressing and cleaning Compacts for cosmetics, manufacture of Compressing and liquefying gases (except petroleum) Concrete products, manufacture of Condensed and evaporated milk, manufacture of Condensed and evaporated milk manufacture of	9.30 8.20 20.20 16.00 20.20 19.00 18.00 9.30 8.10 17.20 8.20 13.00 20.20 16.00 12.20 8.20 8.20 8.20 12.20
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Clivilian barracks, construction of new buildings Clay-working machinery, manufacture of Cleaning and polishing preparations, manufacture of Clocks, watches, materials, and parts, manufacture of Clothes racks, manufacture of Clothing, manufacture of Clothing, manufacture of Clubs, construction of new buildings Coal, mining, storage, and distribution of Coal-tar products, crude and intermediate, manufacture of Coffee-grinding machinery, manufacture of Coffee-grinding machinery, manufacture of Coffee pots, manufacture of Coffee pots, manufacture of Coin-operated weight and amusement machines, manufacture of Coke, production, storage, and distribution of Cold-rolled steel sheets and strip and cold-finished steel bars, manufacture of Collapsible tubes, manufacture of Combines, manufacture of Combines, manufacture of Combines and pigments, manufacture of Combines manufacture of Combines for cosmetics, manufacture of Compressing and liquefying gases (except petroleum) Concrete products, manufacture of Condensed and evaporated milk, manufacture of Condensed and evaporated milk, manufacture of Conduction of tittings, manufacture of Conduction of tittings, manufacture of	9.30 8.20 20.20 16.00 20.20 19.00 18.00 9.30 8.10 17.20 8.20 13.00 20.20 16.00 12.20 8.90
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Corn binders, manufacture of
ture of
ture of
Cotton-ginning machinery, manufacture of
Cotton woven goods and fabrics, manufacture of
ture of
ture of
Decontamination equipment for civilian
use, manufacture of
of
Dental sterilizers, manufacture of 12.20
Derricks, manufacture of
of
Transmit customer's symbol Disc plows, manufacture of 13.00
Dish-washing machines, manufacture of. 16.00 Dispensing pumps, manufacture of Transmit customer's symbol
Distribution of petroleum and petroleum
products 9.20 Docking facilities, for ships operation of 10.40 Dolls, manufacture of 18.00
stoves, manufacture of 16.00
Doors and window sash, manufacture of Transmit customer's symbol
Door closers, manufacture of Transmit customer's symbol
Door hinges, manufacture of Transmit customer's symbol Door knockers, manufacture of
Door springs, Transmit customer's symbol manufacture of Transmit customer's symbol
Doors, manufacture of
Drainboards, tub covers, radiator covers, and table tops, manufacture of 16.00
Dredging machinery, manufacture of 20.20
Dress and semidress gloves and mittens, manufacture of
Drilling machines (metal), manufacture of
Dry shavers, manufacture of 12.20 Dry shavers, manufacture of 12.20 Dust pans, manufacture of 16.00 Dwellings, construction of new build-
Dyeing and finishing cotton, rayon, silk, linen, woolen, and worsted textiles 8.90
Dynamos, electric, manufacture of Transmit customer's symbol —E—
Earphones and parts, household radios,
manufacture of
Electrical measuring instruments, manu-
facture of
Electric face plates, manufacture of Transmit customer's symbol Electric fence controllers, manufacture
of
ture of
of 16.00 Electric motors, manufacture of
Electric outlets, manufacture of Transmit customer's symbol
Electric percolators, manufacture of 16.00 Electric plugs, manufacture of
Electric sockets, manufacture of
Transmit customer's symbol

Electric switches (light), manufacture
Electric switches (light), manufacture ofTransmit customer's symbol
Electric traffic signals, manufacture of. 10.30 Electric water coolers, manufacture of. 16.00
Electrocardiographs, manufacture of 12.20
Electrotyping and stereotyping 17.10 Elevators and escalators, manufacture
Elevators and es: alators, manufacture of
Embroideries, manufacture of 15.00
Enameled-iron sanitary ware and plumb- ing, manufacture of
Transmit customer's symbol
Transmit customer's symbol Engines for farm use, manufacture of. 13.00 Engraving for plate printing 17.10
Engraving for plate printing
Ensilage harvesters, manufacture of 13.00
Envelope fasteners, manufacture of 19.00 Envelopes, manufacture of
Envelopes, manufacture of 19.00 Equipment cabinets for hospitals, manu-
facture of
Ether, manufacture of
Excavating machinery, manufacture of 20.20 Excelsior, manufacture of 8.90
—F—
Fancy boxes for jewelry, combs, toilet
sets, etc. 23.00 Farm implements, manufacture of 13.00 Farm machinery, manufacture of 13.00
Farm machinery, manufacture of 13.00
rarm outbuildings, construction of new 21.90
Farm wagons, manufacture of 13.00 Faucets, manufacture of
Transmit customer's symbol Feathers, plumes, and artificial flowers, manufacture of
manufacture of
Feed cookers, manufacture of 13.00 Feed cutters, manufacture of 13.00
Feed cutters, manufacture of 13.00 Feed grinders and crushers, manufac-
ture of
Feeds for animals and fowls, manufac- ture of
ture of
Fiber cans and tubes, manufacture of
T
Fiber to fabric machinery (textile), manufacture of
File fasteners, manufacture of 19.00 Files and rasps for metal and wood-
working, manufacture of 22.00
Filing cases and cabinets, manufacture
Filing machines (metal), manufacture
of
tion), manufacture of 20.20
Firearms for police authorities, manufacture of
Firearms for private use, manufacture
of
ufacture of 12.30
Fire extinguishers, manufacture of 12.30 Fireplace screens and andirons, manufacture of 16.00
facture of 16.00
Fire stations, operation of
Fireworks, manufacture of 18.00
Fish and marine oils, manufacture of 8.20 Fish scalers, manufacture of 16.00
Flares, manufacture of
Transmit customer's symbol Flashlights, manufacture of 16.00
Flat glass, manufacture of 8.90
Flavorings, manufacture of 14.00
Flashlights, manufacture of 16.00 Flat glass, manufacture of 8.90 Flat irons, manufacture of 16.00 Flavorings, manufacture of 14.00 Floodlights (theater and photographic use), manufacture of 18.00
Floor and wall tile, manufacture of 8.90
Floor and wall tile, manufacture of 8.90 Floor scrapers, manufacture of 22.00
manufacture of 14.00
Flour and other grain-mill products, manufacture of 14.00 Flower vases, manufacture of 16.00 Flush tanks, manufacture of 17.00 Flush tanks, manufacture of 18.00 Flush tanks, ma
Transmit customers symbol
Food pa kaging machinery, manufacture of
of 20.20 Food preparations, manufacture of 14.00 Food products machinery, manufacture of 20.20
Food products machinery, manufacture of
Food warmers, manufacture of 16.00
Footwear, manufacture of
Forgings, manufacture of 8.10
Fracture appliances, manufacture of
Fruit pickers, manufacture of 13.00
Fungicides, manufacture of
Forgings, manufacture of 8.10 Foundries, operation of 8.10 Fracture appliances, manufacture of 12.20 Fruit pickers, manufacture of 13.00 Frying pans, manufacture of 16.00 Fungicides, manufacture of 13.00 Fur coats, garments and trimmings, manufacture of 15.00
Furna es, manufacture of
Transmit customer's symbol
Furs, dressing and dyeing 8.90 Fuses, manufacture of
Transmit customer's symbol
-G-
Games and toys, manufacture of 18.00 Garages, construction of new buildings. 21.90
2000

	- 1-
Garbage cans, manufacture of	9.00
and operation of (except new build-	0 *0
ings)	2.10
Garden tractors manufacture of I	3.00
Garnetting machines (textile), manufac-	
ture of	0.20
Gaskets, manufacture of Transmit customer's syn	nhol
Gas masks for civilian use, manufac-	11001
Gas, natural and manufactured, produc-	2.30
Gas, natural and manufactured, produc-	0.40
tion and distribution of	9.40
Gates, farm, manufacture of	3.00
Gear cutting machines, manufacture of	20.10
	22.00
Gears and crankshafts, manufacture of	
Transmit customer's sy	mbol
Gear-tooth grinding machines, manufac- ture of	20.10
Gelatine, manufacture of	8.20
General commercial printing	17.10
Generating equipment (public), manu-	
Gelatine, manufacture of	9.10
Generators, manufacture of	mhol
Girdling knives, manufacture of	13.00
Glass containers, manufacture of	
	mbol
Glass making	8.90
Glass making	mhal
Glue and gelatine manufacture of	8.20
Grain binders, manufacture of	13.00
Grain drills, manufacture of	13.00
Grain threshers, manufacture of	13.00
Glue and gelatine, manufacture of Grain binders, manufacture of Grain drills, manufacture of Grain threshers, manufacture of Gravure, rotogravure, and rotary photogravure plates, manufacture of Grease and oil cups, manufacture of Grease and tellow (except lubrication)	17 10
Grade and oil supe manufacture of	22.00
Grease and tallow (except lubricating),	22.00
manufacture of	8.20
	22.00
Greenhouses, construction of new build-	
	$21.90 \\ 23.00$
Grov-iron and somistool castings manu-	20.00
facture of	8.10
facture of Grinding machines, manufacture of Gum naval stores (turpentine, rosin, etc.), manufacture of	20.10
Gum naval stores (turpentine, rosin,	0.00
etc.), manufacture of	8.20
Gypsum products, manufacture of	0.30
Hair curlers, manufacture of	12.20
Hair driers (electric), manufacture of	12.20
Hair works (braids wice switches	
etc.), manufacture of	12.20
Hand and face driers, manufacture of.	12.20
Hand instruments for dentists, manufacture of	12.20
Handkerchiefs, manufacture of Handscrapers, manufacture of Hand stamps, manufacture of	15.00
Handscrapers, manufacture of	22.00
Hand stamps, manufacture of	19.00
Hangars, commercial and private and other airport buildings, construction	
of	21.10
of Harness hardware, manufacture of	13.00
Harrows, manufacture of	13.00 13.00
Hat and cap materials (trimmings, etc.),	19.00
manufacture of	15.00
Hat hodies and hats, fur and wool felt,	
manufacture of Hat machinery, manufacture of	15.00
Hat machinery, manufacture of	20.20
Hay carriers manufacture of	13.00
Hatters' fur, production of Hay carriers, manufacture of Hay forks, manufacture of Haying machinery, manufacture of Hay loaders, manufacture of	13.00
Haying machinery, manufacture of	13.00
Hay loaders, manufacture of	13.00
Hay-press combines, manufacture of Hay presses, manufacture of	10.00
Health lamps, manufacture of	12.20
Health centers, construction of Health lamps, manufacture of Heaters for construction work, manufacture of Highway fenres, construction of Highway markers, manufacture of Hog scrapers manufacture of	
facture of	20.20
Highway fences, construction of	10.30 10.30
Hog scrapers, manufacture of	
Hog scrapers, manufacture of	13.00
Hoists and winches, manufacture of	20.20
Home radio equipment, manufacture of Homes, construction of	16.00
Homes, construction of Hooks and eyes, manufacture of	$21.20 \\ 15.00$
Hose clamps, manufacture of	
Hosiery all types manufacture of	22.00
Hospital, doctors' and dental equipment,	15.00
manufacture of	15.00
Hospital, doctors' and dental equipment, manufacture of Hospital furniture, manufacture of Hospital signaling devices, manufacture	15.00 12.20
of	15.00 12.20 12.20
Hospitale construction of	15.00 12.20 12.20
Tropitate, Company	15.00 12.20 12.20
Hospital, surgical and other "steril-	15.00 12.20 12.20
Hospital, surgical and other "steril- izers," manufacture of	15.00 12.20 12.20
Hospital, surgical and other "steril- izers," manufacture of Hotels, construction of	15.00 12.20 12.20
Hospitals, construction of Hospitals, construction of Hospitals, surgical and other "steril- izers," manufacture of Hotels, construction of House dresses, uniforms, and aprons, manufacture of	15.00 12.20 12.20 12.20 21.90 12.20 21.20
Hospital, surgical and other "steril- izers," manufacture of Hotels, construction of House dresses, uniforms, and aprons, manufacture of House furnishings, manufacture of	15.00 12.20 12.20 12.20 21.90 12.20 21.20
House furnishings, manufacture of Household brooms, manufacture of	15.00 12.20 12.20 21.90 12.20 21.20 21.20 15.00 16.00 16.00
House furnishings, manufacture of Household brooms, manufacture of	15.00 12.20 12.20 21.90 12.20 21.20 21.20 15.00 16.00 16.00
Hospital, surgical and other "sterilizers," manufacture of Hotels, construction of House dresses, uniforms, and aprons, manufacture of House furnishings, manufacture of Household brooms, manufacture of Household brushes, manufacture of Household utensils, manufacture of	15.00 12.20 12.20 21.90 12.20 21.20 21.20 15.00 16.00 16.00

—R—	Slide fasteners, manufacture of 15.00	Toilet preparations, manufacture of 12.20
	Small construction tools, manufacture of 22.00	Tool boxes, manufacture of 22.00
Radio cabinet parts (domestic), manu-	Smelters, operation of 8.10	Tools for drop forging, manufacture of 22.00
facture of 16.00	Snap fasteners and clasps, manufacture	Tools, small, manufacture of 22.00
Radio chassis bases, manufacture of 16.00	of 15.00	Tooth brushes, manufacture of 12.20
Radio parts, manufacture of 16.00	Snow plows (street and highways),	Tooth paste, manufacture of 12.20
Radio sending and receiving sets manu- factured for police and fire authorities 12.30	manufacture of 10.30	Toys, manufacture of 18.00
Radio set analyzers, manufacture of 16.00	Soap, manufacture of	Track for hay carriers, manufacture of 18.00
Radio tube checkers, manufacture of 16.00	Soda fountains, beer dispensing equip-	Tractors, agricultural use, manufacture
Radio tubes and radios 16.00	ment, and related products, manufac-	of 13.00
Railings, manufacture of	ture of 14.00	Tractors (except farm), manufacture of 20.20
Transmit customer's symbol	Sodium compounds, manufacture of 8.20	Traffic signs, electric, manufacture of 10.30
Railroads, public, operation of 10.10	Soil pulverizers, manufacture of 13.00	Trailers, manufacture of 10.20
Railroad track tools, manufacture of 22.00	Soybean oil, production of 8.20	Transplanters, manufacture of 13.00
Rails and railroad spikes, manufacture of 8.10	Special industrial machinery, manufac-	Transportation—air 10.50
Raincoats and other waterproof gar-	ture of 20.20	Transportation—automotive 10.20
ments, manufacture of 15.00	Spectacle and eyeglass frames, manufac-	Transportation by pipeline petroleum 9.20
Rakes, manufacture of 13.00	ture of 12.20	Transportation-railroads, including ur-
Range boilers, manufacture of 16.00	Sphygmomanometers, manufacture of 12.20	ban and interurban 10.10
Rayon fabrics, manufacture of 8.90	Spigots, manufacture of	Transportation-roads, streets, etc., con-
Rayon yarn and thread, manufacture of 8.90	Transmits customer's symbol	struction and maintenance of 10.30
Razor blade scrapers and holders (except	Spinning machines, manufacture of 20.20	Transportation-water, including con-
razors), manufacture of 22.00	Spoons and silverware, manufacture of 16.00	struction of privately owned ship-
Razors and razor blades, manufacture of 12.20	Sporting and athletic goods, manufac-	yards, other than military 10.40
Refining of petroleum 9.20	ture of 18.00	Trimmings, stamped art goods and art
Refractometers, spectrometers, spectro-	Sprayers and sprinklers for street and	needlework, manufacture of 15.00
scopes, polariscopes, and optical mea-	highway use, manufacture of 10.30	Trucks, manufacture of 10.20
suring instruments, manufacture of 12.20	Spraying outfits, manufacture of 13.00	Trusses (health), manufacture of 12.20
Reinforcing steel, manufacture of 8.10	Spring winding and forming machines,	Tunnels, highway, construction of 10.30
Retreading of tires 10.20	manufacture of 20.10	Typewriter ribbons, manufacture of 19.00
Rice binders, manufacture of 13.00	Sprinklers and automatic fire detecting	Typewriters, manufacture of 19.00
Rice cleaning and polishing 14.00	apparatus, manufacture of 12.30	_U_
Rivet sets, manufacture of 22.00	Stainless steel kitchenware, manufacture	
Rivets, manufacture of	of	Umbrellas, parasols, and canes, manu-
Transmit customer's symbol	Stalk cutters, manufacture of 13.00	facture of 15.00
Road maintenance 10.30	Stationery, manufacture of 19.00	Universities, operation of 17.20
Road oilers, manufacture of 10.30	Statuary and art goods, manufacture of 23.00	Upholstered household furniture, manu-
Roads, construction of 10.30	Steam tables (food), manufacture of 16.00	facture of 16.00
Road sweepers, manufacture of 10.30	Steam and hot-water heating appara-	_v_
Robes, lounging garments and dressing	tus, manufacture of	
gowns, manufacture of 15.00	Transmit customer's symbol	Vacuum cleaners, manufacture of 16.00
Rod and wire forming machines, man-	Steel castings, manufacture of 8.10	Valves, manufacture of
ufacture of	Steel engraving tools, manufacture of 22.00	Transmit customer's symbol
Rod weeders, manufacture of 13.00	Steel mills, operation of 8.10	Varnishes, manufacture of 8.20
Rolling mill machinery, manufacture of 20.10	Steel plow shapes or shares, manufac-	Vegetable oils, production of 8.20
Roofing, asphalt shingles, and roof coat-	ture of 13.00	Vending, amusement, and other coin-
ing, manufacture of 8.90	Steel works and rolling mills, operation	operated machines, manufacture of 18.00
Rope and cable for marine use, manu-	of 8.10	Veneer machines, manufacture of 20.20
facture of 10.40	Stethographs, manufacture of 12.20	Venetian blinds, manufacture of
Rotary hoes, manufacture of 13.00	Stethoscopes, manufacture of 12.20	Transmit customer's symbol
Rowboats, manufacture of 10.40	Stock feeders, manufacture of 13.00	Veterinarians' instruments, manufacture
Rubber boots and shoes, manufacture of 15.00	Stock pens, manufacture of 13.00	of 12.20
Rules, manufacture of 22.00	Stock tanks, manufacture of 13.00	Vibrators (health), manufacture of 12.20
-S-	Stone drills, manufacture of 22.00	Vibrators (industrial), manufacture of. 20.20
-3-	Storage of petroleum 9.20	Vinegar and cider, manufacture of 14.00
Saddlery, harness and whips, manufac-	Store furniture and fixtures, manufac-	_w_
ture of 13.00	ture of 19.00	
Safes and vaults, manufacture of 19.00	Stores, construction of 21.10	Wagons (except farm), manufacture of. 10.90
Salad dressing, manufacture of 14.00	Storm sewers, construction of 10.30	Wagons for agricultural use, manufac-
Salt, production of 8.20	Stoves and ranges (cooking), manufac-	ture of 13.00
Sand, production of 8.90	ture of 16.00	Wallboard, and wall plaster, manufac-
Sand, lime, brick, block, tile, produc-	Streetcar companies, operation of 10.10	ture of 8.90
tion of 8.90	Structural steel, manufacture of 8.10	Wallpaper, manufacture of 16.00
Sausage and sausage casings, manufac-	Subsoil plows, manufacture of 13.00	Wall scrapers, manufacture of 22.00
ture of 14.00	Sugar bowls, manufacture of 16.00	Warehouses, construction of 21.10
Sawmill machinery, manufacture of 20.00	Suit cases, brief cases, and other lug-	Wash basins, manufacture of 16.00
Sawmills, operation of 8.90	gage, manufacture of 23.00	Watch cases, manufacture of 23.00
Saws for steel, wood, etc., manufacture	Sulphur, production of 8.20	Water heaters, manufacture of
of 22.00	Surgeons' knives, manufacture of 12.20	Transmit customer's symbol
Scales and balances, manufacture of 20.20	Surgical and medical instruments, man-	Watering trough, manufacture of 13.00
Scalpels, forceps, and similar instru-	ufacture of 12.20	Water pumps (farm), manufacture of 13.00
ments, manufacture of 12.20	Surgical belts, manufacture of 12.20	Water purification plants, construction
Schools, operations of	Surgical blades, manufacture of 12.20	and operation of (except new build-
Scotch tape holders, manufacture of 19.00	Suspenders and garters, manufacture of 15.00	ings) 12.10
Scrapers, manufacture of 20.20	Syphon bottles, manufacture of 16.00	Water reservoirs, construction of 12.10
Screens, manufacture of	Syrup evaporators (maple), manufac-	Water systems (public), construction
Transmit customer's symbol	ture of 13.00	and operation of
Screw machine products and wood		Weeders, manufacture of 13.00
screws, manufacture of	—T—	Whisk brooms, manufacture of 16.00
Transmit customer's symbol	Table cutlery, manufacture of 16.00	Wines, manufacture of 14.00
Sewage systems, construction and opera-	Tacks and staples, manufacture of 22.00	Wind mills, manufacture 13.00
tion of 12.10	Tank heaters (farm), manufacture of 13.00	Window and door screens, manufacture
Sewing machine needles, manufacture of 16.00	Tanks and shells for water heaters,	of Transmit customer's symbol
Sewing machines (home), manufacture	manufacture of .Transmit customer's symbol	Wire baskets (office use), manufacture
of 16.00	Tanning materials, natural dyestuffs,	of 19.00
Sewing machines (industrial), manufac-	mordants and sizes, manufacture of 8.20	Wire clippers, manufacture of 22.00
ture of	Tape measures, manufacture of 22.00	Wire drawing machines, manufacture of 20.10
Shaping machinery (metal), manufac-	Tape moisteners, manufacture of 19.00	Wire staples, manufacture of 19.00
ture of	Taxis, manufacture of 10.20	Wire tag fasteners, manufacture of 19.00
Sheep's foot rollers, manufacture of 20.20	Teapots, manufacture of 16.00	Wire tighteners, manufacture of 22.00
Sheet metal, manufacture of 8.10	Te'egraph companies, operation of 11.30	Women's and misses' clothing, manufac-
Shellac, manufacture of 8.20	Telegraph equipment, manufacture of 11.30	ture of 15.00
Shepherds' crooks, manufacture of 13.00	Telephone companies, operation of 11.10	Wood naval stores (turpentine, rosin,
Shiploading equipment, manufacture of 10.40		etc.), manufacture of 8.20
Ship safety devices, manufacture of 10.40	Telephone control offices and repeater	Woodworking machinery, manufacture
Ships, construction of 10.40	stations, construction of new build-	of 20.20
Shipyards, operation of	Tolephone equipment manufacture of 11.10	Wood pulling 8.90
Shoe buckles, manufacture of 15.00	Telephone equipment, manufacture of 11.10	Work clothing, manufacture of 15.00
Shoe knives, manufacture of 22.00	Textile machinery, manufacture of 20.20	Work gloves, manufacture of 15.00
Shoe lace tips, manufacture of 15.00	Theater equipment, manufacture of 18.00	Work shirts, manufacture of 15.00
Shoe machinery, manufacture of 20.20	Theaters, operation of 18.00	Wrapping paper, manufacture of 23.00
Shoes, manufacture of	Threshing machines, manufacture of 13.00	Writing ink, manufacture of 19.00
Signal clips, manufacture of 19.00	Tillers, manufacture of	-X-
Signs, advertising displays and novelties,	Tin and other foils, manufacture of 8.10	
manufacture of	Tin cans, manufacture of	X-ray apparatus for dental use, manu-
Silos, manufacture of	Transmit customer's symbol	facture of 12.20
Sinks, manufacture of	Tires, manufacture of 10.20	X-ray apparatus for medical use, manu-
Transmit customer's symbol	Tire spreaders, manufacture of 22.00	facture of 12.20
Sirens, for use by police and fire authori-	Tobacco and snuff, manufacture of 14.00	X-ray and therapeutic apparatus, man-
ties, manufacture of 12.30		
		ufacture of 12.20
Slate, quarrying and production of 8.90	Tobacco machinery, manufacture of 20.20	—Y—
Sledges and bars, manufacture of		

May Steel Scrap Consumption Sets New All-Time Record

• • • Iron and steel scrap consumption in May was estimated by the Institute of Scrap Iron & Steel at 4,857,000 gross tons, the highest monthly consumption on record. The previous record was 4,840,000 gross tons used in March, 1942; with April the third highest month, at 4,672,000 tons.

This scrap represented in considerable degree the results of the various salvage programs. Scrap dealers are also beginning to han-

More scrap news appears on pages 126 and 127 this week.

dle an increased amount of scrap that is generated in the various processes of converting steel into materiel of war. Turnings from the manufacture of shells are now coming out in volume.

In the first five months of 1942, total consumption of scrap at 23,-235,000 gross tons also established a five-month record. In the corresponding period of 1941 consumption was 22,127,000 tons, while in 1940 it was 14,730,000 gross tons.

This record melt in the first five

months of 1942 exceeded the total melt in all 1938 and was two and one-half times the tonnage consumed in 1932.

Army Speed Scrap Salvage To Supply War Industries

• • • The Army is intensifying salvage operations to make all scrap it can collect available to war industries. Officers in charge of Army salvage work will have expert advice from WPB as to methods of collection, segregation, and classification of salvaged materials, and timely information on current needs and scrap prices. To facilitate this service, the Bureau of Industrial Conservation is establishing regional advisory offices for use of the Corps Area commanders and Supply Services chiefs

Every Army station and depot has a special salvage officer to collect and sell to licensed junk dealers the material that accumulates at such points. Industrial scrap will be disposed of through WPB when it is collected in quantity.

Recent Army surveys disclosed several thousand tons of obsolete equipment that could be used as industrial scrap. All such accumulations will be reported to the Bureau of Industrial Conservation.

WILLOW RUN CONFERENCE: Conferring near a hangar at the Ford, Willow Run, Mich., plane plant, are, left to right: W. Averill Harriman, Lend-Lease expeditor; Edsel Ford, president of Ford Motor Co.; Ernest Kanzler, WPB's automotive director; Henry Ford; C. E. Sorenson, Ford official; Donald M. Nelson, WPB's chairman, and Oliver Lyttleton, British Minister of Production.



Graveyards Yield 383,253 Tons of Steel Scrap in May

• • • Estimates of the Bureau of Industrial Conservation indicate that during May, 383,253 tons of scrap iron and steel were shipped out of auto wreckers' yards. This was 10 per cent greater than April and more than 100 per cent greater than the average monthly recovery during 1941 from the same sources.

The best record of scrap return from auto graveyards was set by the region including the states of Texas, Oklahoma and Louisiana, which produced 81,888 tons. The New York and New Jersey area was next, yielding 46,427 tons.

In addition to the ferrous metals, the graveyards also salvaged large quantities of other critically needed metals, like copper and aluminum. The tonnage turned out of graveyards in April and May combined is equivalent to the total tonnage inventory, that is the whole graveyard population of unusable cars, revealed in a survey of such stocks in February.

Ammunition Gain, Scrap Loss Washington

• • • The British Purchasing Commission has informed WPB that a large number of 9.2 in. shells, previously ordered scrapped, which have been in storage in the United States will be shipped to England. These shells were made for a type of gun no longer manufactured, but a considerable number of these guns is still in use, requiring ammunition.

T.C.&l. Breaks Records in Raw Material and Steel Output

• • • Production records for raw and finished materials are being smashed with regularity through teamwork of men and management of the Tennessee Coal, Iron and Railroad Co., Robert Gregg, president of the company said.

In May, one of the ore mines doubled its previous production record; one of the mine's divisions broke previous records in ore output; and all records were broken in the production of dolomite and limestone. One group of blast furnaces, augmented by the recent addition of a modern pig iron maker, broke all previous records, which, in turn, enabled the open hearth furnaces to break steel-making records.

John L. Lewis Like Hitler, Murray Says

Bellair, Ohio

• • • • Putting John Lewis in the same class as Adolf Hitler, Philip Murray, CIO president, said: "If John Lewis has 27 puppet states in the United Mine Workers and Adolf Hitler has 27 puppet states in Europe, then one is just as bad as the other. For all practical purposes it is just as necessary to eliminate one as it is the other."

Mr. Murray made these charges and called for destruction of dictatorships in every form at an American-Slav Day celebration here Sunday.

Sunday.

Charging that he was a victim of a "purge" because of his consistent support to President Roosevelt, Murray promised that he would still support Roosevelt whether he was "purged" or not.

Mr. Murray said that, as vicepresident of the UMWA when that organization donated funds to the CIO, he never knew until March 15, 1942, that the UMWA had loaned a single nickel to the CIO. There never was a word mentioned about a loan either in convention or out of convention, he said.

New Shipyard to Build Concrete Cargo Vessels

Washington

• • • Approximately 36,000 tons of reinforcing bars will be required for the 24 reinforced concrete cargo vessels to be built by Mc-Closkey & Co., Philadelphia, under a Maritime Commission contract. The vessels will be constructed in a new shipyard to be built at Tampa, Fla. One ship will be completed this year and the remainder by June 30, 1943. At the offices of the Maritime Commission it was said it was decided to build the ships of concrete rather than of steel because of the shortage of steel.

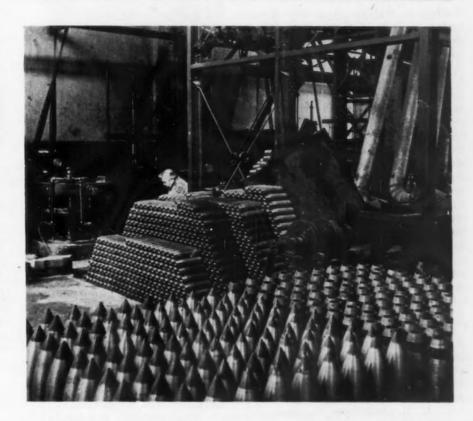
The vessels will have a deadweight tonnage of 5200. They will be single screw ships and will be propelled by steam reciprocating engines, the engines to be slightly smaller than those in the Liberty ships.

The commission also has either under construction or contract 33 reinforced concrete barges built along the same lines as the concrete cargo vessels.

Steel & Wire Sets Record

Cleveland

• • • American Steel & Wire Co. held an elaborate celebration at Worcester, Mass., last week in connection with the award of a Navy E, but the company's public relations department decided to be unique by NOT sending any description of the festivities to industrial publications.



MEXICO AT WAR: Thousands of shells, ready for delivery from a Mexican plant, are shown here (above). Arms producing plants in Mexico City and several other industrial areas of United States' neighbor to the south are busy in a very tangible way, aiding the war effort. Below is shown an inspection depot of a Mexican factory that makes rifle barrels.



PERSONALS

- John F. Devine, vice-president of the General Printing Ink Corp., New York, and general manager of the Fuchs & Lang Mfg. Co. division, will act as general manager of the company's new General Industrial Finishes Division. Walter A. McKim, previously director of industrial research for the Pittsburgh Plate Glass Co., will be assistant general manager.
- . J. A. Danner, known to thousands of busy men in the Chicago area as industrial sales promoter for Standard Oil Co. of Indiana's Chicago division, has retired under the company's pension plan. Mr. Danner began his service with Standard 261/2 years ago after 14 years with Illinois Steel and four with International Harvester. Replacing Mr. Danner is Harry G. Stiles, assistant promoter of industrial sales who during much of his 20 years experience with the company has served as an expert counselor to industrial plants on lubricating problems.
- Harry C. Beaver has been elected president of Worthington-Gamon Meter Co. to succeed the late E. T. Fishwick. Mr. Beaver is also president of the Worthington Pump & Machinery Corporation. R. R. Anderson, treasurer and manager of Worthington-Gamon Meter Co., has been elected vice-president and director, as well as retaining his office as treasurer.
- John G. Beach has been named a research engineer on the technical staff of Battelle Memorial Institute, Columbus, Ohio, where he has been assigned to the division of electrochemistry.
- William M. Black was made a vice-president of the American Brake Shoe & Foundry Co. Mr. Black has been president of the American Manganese Steel Division of the American Brake Shoe & Foundry Co. since 1940 and will continue in that capacity. He joined this division in 1912 and became its general sales manager in 1934 and vice-president in 1935.
- A. A. Derse has been named manufacturing manager of Murray Corp. of America. Mr. Derse





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A. J. HAZLETT and V. A. JEVON, whose appointments as assistant general managers of sales, Jones & Laughlin Steel Corp., were announced in these columns in the issue of June 11.

formerly was production manager of Plants 1 and 2. He has been a Murray employee since 1924, serving first as general foreman of the body assembly department and later as superintendent of the body in white assembly. Previously he was with the Mitchell Motor Car Co. in Racine, Wis., and the H & M Body Corp., which was purchased in 1924 by Murray.

Herman W. Steinkraus, formerly vice-president and general manager of the Bridgeport Brass Co., has been elected president

VICTOR F. STINE, who is celebrating 30 years of service with the Pangborn Corp.

and retains his post as general manager of the company.

- John P. Maddigan has been elected president and treasurer of the Buffalo Structural Steel Corp. to succeed William G. Houch who died in May. Mr. Maddigan will continue temporarily as the company's secretary and general manager.
- Victor F. Stine on July 1 will be felicitated by the Pangborn Corp., Hagen, Md., on completion of 30 years of continuous service with the company. In 1931 Mr. Stine was made sales manager and was elected second vice-president four years later. In 1940 he was advanced to vice-president in charge of sales.
- John M. Lupton has been added to the staff of the Acheson Colloids Corp., Port Huron, Mich., in the capacity- of advertising manager. For the past two years he had been associated with the Robins Conveying Belt Co., Passaic, N. J.
- John Priebe has been appointed to the advertising department of the Allis-Chalmers Mfg. Co. to replace Horace M. Kinne who has been made chief of the company's purchasing of office supplies.
- George B. Botfield has been appointed assistant vice-president of the Botfield Refractories Co.. Philadelphia. Mr. Botfield will be in charge of the Pittsburgh territory.

OBITUARY ...

- · Charles M. Denise, former general manager of sales, fabricated steel construction, Bethlehem Steel Co., Bethlehem, Pa., died suddenly on June 12. Mr. Denise resigned his position with the Bethlehem Steel Co. last October because of continued ill health. In 1903, Mr. Denise became affiliated with McClintic-Marshall Co., Pittsburgh, and the following year was placed in charge of its Chicago office where he remained for 15 years, until he was transferred to Pittsburgh to supervise the entire sales department. When the company was acquired by Bethlehem, in 1931, and a new subsidiary, McClintic - Marshall Corp., was formed, Mr. Denise was appointed vice-president in charge of the sales department. Beginning in 1936, the business of the subsidiary was conducted in the name of the parent company, and Mr. Denise became general manager of sales, fabricated steel construction, Bethlehem Steel Co.
- H. L. Green, of H. L. Green & Co., Chicago, died June 13, after several months' illness, aged 90 years.
- George L. Uihlein, president of the Uihlein Electric Co., Milwaukee, died June 12. He was 58 years old.
- Henry Morman, until six years ago, purchasing agent for the Cherry-Burrell Corp., Milwaukee, and for the last four years vice-president of the National Utilities Co., pump manufacturers, Milwaukee, died June 14. He was 72 years old.
- Edward Morton, Jr., of the Philadelphia Steel & Iron Co., Conshohocken, Pa., died May 28.
- ⁶ Charles Edward Bowron, who served as chief engineer for the Gulf States Steel Co., Birmingham and Gadsden, Ala., for more than 20 years prior to the company's purchase by Republic Steel Corp. in April, 1937, died June 17, aged 71 years.
- Roy de Staebler, vice-president for 29 years of Beck & Corbitt Co., iron and steel jobbers, St. Louis died of a heart attack while on vacation at Joplin, Mo. He was 70 years old.

Electroplaters Discuss Armament Applications

(CONCLUDED FROM PAGE 66)

Anodizing may be performed in the chromic acid bath or the sulphuric acid bath. Chromic acid may be used on all aluminum alloys containing less than 5 per cent copper. The bath consists of 5 to 10 per cent chromic acid, operated at 95 deg. F. The sulphuric acid bath uses an electrolyte of 15 to 18 per cent* sulphuric acid at 70 deg. F. in a lead-lined tank. Full voltage (10-20 volt d.c.) is applied at once. The treatment is complete in 20 min., after which the work is sealed for an equal length of time, rinsed and dried.

*Alumilite Process No. 210, Aluminum Co. of America.

Chromadizing, for improving paint adhesion, is the immersion in a 5 per cent solution of chromic acid at 120 to 140 deg. F. for 1 to 2 min. It may be necessary to use a wetting agent, such as Aerosol OT. 0.004 per cent added daily.

The alcohol-phosphoric cleaner is used for similar purposes, but not for assemblies. It is applied by wiping on with a rag, dipping or spraying. A formula as given in U. S. Army Specification No. 98-20007 is:

		er cent
Butyl alcohol	 	40
Isopropyl alcohol		
Phosphoric acid (85 per cent)	 	10
Water		20

The alkaline chromate process (Aluminum Co. of America's Alrok) consists of the application of a thick oxide film in a dichromate-sodium carbonate mixture. This film is sealed by boiling in a dichromate solution. It also provides an excellent paint base.

The sodium silicate process is used for sealing aluminum castings which must stand pressure. Sodium silicate, 40 deg. Be, is reduced with 4 volumes of water and heated to 150 deg. F. The clean casting is immersed, air dried and baked for 30 min., at 300 deg. F.; permitted to cool to room temperature; immersed for 1 min. in cold 5 per cent H₂SO₁; rinsed and dried at room temperature.

Magnesium and its alloys are protected in much the same way as aluminum. They consist largely of preparation for paint. The two most common processes are the chrome pickle and the dichromate boil. Both are described in U. S. Army Specification No. 98-20010.

The chrome pickle consists of:

Room temperature is held, except for die castings, which are treated at 122 deg. F. The part is immersed for 30 sec. to 2 min., removed, drained 5 sec. and rinsed in cold water. Die castings are dipped for 10 sec. in the heated solution. It yields a good shop coat but cannot be used for machined parts as it removes up to 0.0006 in. per surface.

For such parts the dichromate boil is employed, as it leaves dimensions practically unchanged. It consists of cleaning, pretreatment and treatment. Cleaning is done by vapor degreasing or soaking in a hot, heavy duty alkaline cleaner; or chromic acid pickling; or a nitric pickle; the pretreatment is a 5 min. dip in 15 per cent to 20 per cent (by weight) hydrofluoric acid. The treatment (Dow 7 or AMC Treatment G) is done by boiling for at least 45 min. in a 10 per cent sodium dichromate solution; pH 4.2-5.5.

This paper also described in some detail the conventional treatments for steel, including cadmium plating, chemical oxide blacks and pickles for stainless steel. One chemical black cited was a boiling solution of sodium hydroxide and oxidation catalysts (10 lb. per gal.) for camouflage effect on steel. Pickles for stainless steel were given as:

	by volume
1.	Nitric acid, conc 10-20
	Hydrofluoric acid 48-52 per cent 1-3
	Water Balance
	Temperature 130 to 150 deg. F.
	Per cent
	by weight
2.	Sulphuric acid 10
	Rock salt
	Water Balance
	Temperature 160 to 180 deg. F.

Per cent

The paper also described direct (hard) chromium; copper plating for anti-seize surfaces; tin plating; lead plating; calorizing (heating steel parts in aluminum powder); painting and lacquering and their required undercoats.

Editor's Note:—This report will be concluded next week, with descriptions of surface treatments or magnesium, the sulfamate lead plating process, the effects of surface finish on the protective value of electroplated coatings on steel, as well as several other interesting abstracts.

MACHINE TOOLS

. . . SALES, INQUIRIES AND MARKET NEWS

Canadians Get Blanket A-1-a Ratings for Machine Tools

Washington

• • • General Preference Order No. E-1-c issued on June 16 by the WPB gives machine tool purchasers in Canada other than Service purchasers a blanket A-1-a preference rating, the same as other foreign purchasers. Sequence of delivery of tools to Canadian prime and subcontractors of the Army, Navy or Mari-

For other changes in priority regulations and information on the Production Requirements Plan, see pages 108 and 113.

time Commission is still controlled by their urgency standing on the revised numerical master preference list, No. 3.

On the same date the WPB also clarified an earlier order, E-1-b, relating to service purchasers. AA ratings, the interpretation rules, should not be sought for the purpose of expediting deliveries of machine tools to service purchasers. The issuance of an AA rating to a service purchaser whose name does not appear on the numerical preference list merely places him ahead of other

service purchasers not on the list. Deliveries to those purchasers on the list is still governed by their urgency standings. Where it is desired to accelerate the delivery date of a tool to a service purchaser, a specific order can be obtained from the director of industry operations diverting a tool from another service purchaser for this purpose.

Machine Tool "War Finish"

Chicago

• • • Machine tools now being shipped are carrying a new war service badge, entitled "War Finish." As a result of a WPB regulation which restricts the number of coats of paint that can be used and which eliminates the use of fillers, many of the grinding, chipping and other finishing marks show through the paint when viewed closely.

In order that customers may fully understand the change and will not, after the war, accuse a manufacturer of turning out shabby tools, machine tool makers are attaching various types of markers on the tools to indicate the reason for the new finish. These markers range from redwhite-blue transfers to small metal plates which state that the finish is in accordance with WPB requirements.

The leveling off in orders continues in most lines, although it is particularly noticeable in drills. Lend-lease shipments, especially to Russia, continue at an active

More Industrial Advisory Committees Appointed

Washington

• • • The formation of industry advisory committees during the week beginning June 15 was announced by WPB on Monday. They include:

Brass Mill Industry-Francis R. Ken-Research advisory, Coppernment presiding officer. Copper Branch, members are:

members are:

John A. Coe, Jr., vice-president, the American Brass Co., Waterbury, Conn.; Robert L. Coe, vice-president, Chase Brass & Copper Co., Waterbury, Conn.; J. A. Doucett, vice-president, Revere Copper & Brass, Inc., New York; W. M. Goss, vice-president, Scovill Mfg. Co., Waterbury, Conn.; J. P. Lally, president, C. G. Hussey & Co., Pittsburgh; H. L. Randall, president, Riverside Metal Co., Riverside, N. J.; F. L. Riggin, president, Mueller Brass Co., Port Huron, Mich. Copper Wire & Cable Industry—Francis R. Kenney, Research Advisory, Copper Branch, government presiding officer. Committee members are:

W. E. Sprackling, Anaconda Wire &

Committee members are:

W. E. Sprackling, Anaconda Wire & Cable Co., New York; D. R. G. Palmer, General Cable Corp., New York; H. L. Erlicher, General Electric Co., Schenectady, N. Y.; Wiley Brown, Phelps Dodge Copper Products Corp., New York; C. A. Scott, Rome Cable Corp., Rome, N. Y.; F. C. Jones, Okonite Co., Passaic, N. J.; Everett Morse, Simplex Wire & Cable Co., Cambridge, Mass.

Ferrochromium Producers Indus Andrew Leith, Chief, Manganese Chrome Branch, government presofficer. Committee members are: presiding

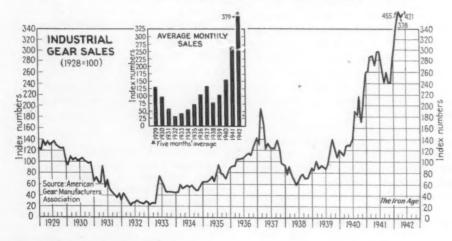
W. J. Priestley, Electrometallurgical Co., New York; Ward A. Miller, Vana-dium Corp., of America, New York; Charles F. Colbert, Jr., Pittsburgh Metal-lurgical Co., Niagara Falls, N. Y.; L. G. Pritz, Ohio Ferro-Alloys Corp., Canton, Ohio Electrometallurgical

Cast Iron Boiler & Radiator Industry—
W. W. Timmis, Chief, Plumbing and
Heating Branch, government presiding
officer. Committee members are: Heat. officer. C

officer. Committee members are:
R. E. Daly, American Radiator & Standard Sanitary Corp., Pittsburgh; V. A. Good, sales manager, Burnham Boiler Corp., Irvington, N. Y.; L. N. Hunter. vice-president, National Radiator Co., Johnstown, Pa.; John P. Magos, Crane Co., Chicago; J. F. McIntire, vice-president, United States Radiator Corp., Detroit; H. F. Randolph, vice-president, International Heater Co., Utica, N. Y.; Stanley K. Smith, vice-president, the H. B. Smith Co., Inc., Westfield, Mass.; Lester O. Stearns, vice-president, Columbia Radiato; Co., McKeesport, Pa.; W. R. Stockwell, Weil-McLain Co., Michigan City, Ind.

June Gear Sales Show Renewed Rise

 Industrial gear sales in May were 11.1 per cent above the April index number, according to the American Gear Manufacturers' Association. The April index had shown a decline of 17 per cent from the March high of 455. The index of sales for the first five months of 1942 is 38 per cent above the index for the corresponding period in 1941.



NON-FERROUS METALS

. . . MARKET ACTIVITIES AND PRICE TRENDS

Arc Welding Magnesium Possible by New Method Developed by Northrop

o o o A new magnesium welding process, known as the "heliarc" welding method, has been developed by Northrop Aircraft Inc., Los Angeles, that will make possible extended use of magnesium in airplane construction, replacing to a large extent aluminum which is now the primary metal. The "heliarc" process makes possible, it is claimed, arc welding of magnesium sheets, extrusions, and tubing into simpler, lighter, and more rigid structures than is possible in the now standard duralumin construction.

While magnesium has been used extensively for some engine and accessory parts in aircraft, it has never been utilized in the structural parts of the plane because of the difficulties encountered in fabricating. The "heliarc" method not only makes possible the use of magnesium for structural parts, but speed and range of the craft are extended through its use, and production itself is hastened.

Such a method will do away with most of the 35,000 rivets required in pursuit ships and the 150,000 rivets in bombers. While it is not expected that magnesium will entirely replace aluminum as the primary aircraft metal, the "heliarc" welding process opens up a vast new supply of metal to the aircraft industry, and will result in research for broader and more extended use of the ultralight metal.

March prices of five leading brass and wire mills have been set as the ceilings at which fabricators may sell their excessive or frozen stocks of brass and wire mill products if they are otherwise unable to determine ceilings of the general maximum price regulation. The order, No. 10 to the general maximum price regulation, does not cover sales by a brass mill or to sales at wholesale or retail as defined in the regulation, since adequate provision for the determination of maximum prices is already contained in the regulation. Distributors are authorized by order No. 10 to use the same method as wholesalers in setting ceiling prices. Under the order, a fabricator who would have to have OPA establish a ceiling price for his sales of new brass or wire mill products, is permitted to charge the applicable price during March, 1942, for a sale of the same quantity of the same product to an industrial consumer as set forth in the published lists, extras, and discounts of the five leading brass and wire mills, namely, the American Brass Co., General Cable Corp., Revere Copper & Brass, Inc., Bridgeport Brass Co., and Anaconda Wire & Cable Co.

The products covered by the order include new plate, sheet, strip, roll, coil, wire, rod, bar, tubing, tube, pipe, extrusion, forging, anode or other shape made from copper or copper base alloys by a brass or wire mill. Copper base alloy includes any alloy metal at least 40 per cent of which, by weight, is copper. The order does not apply to any rod, coil, wire, or other shape for which revised price schedule No. 82 establishes a maximum price.

While upwards of 300,000 tons of copper and copper base alloys now exist as idle and excessive in-

IIISO

BOLT STRETCH MEASURED: Using a micrometer accurate to 0.000002in., this inspector of Wright Aeronautical Corp. measures the stretch of a bolt that holds together two sections of the crankshaft of a Cyclone 1700 hp. engine. Under 1500 ft. lb. pressure, the bolt is tightened until it stretches exactly 0.008 in. ventories in the hands of manufacturers as a result of the copper conservation orders, Copper Recovery Corp., has been striving to carry out plans for the purchase and disposal of this material. Acting as an agent for MRC, Copper Recovery Corp., will buy all such metal sold voluntarily, purchases being subject to inspection and verification of weight and specifications. The offer to purchase will be made for a short time only, after which the government will requisition idle stocks. The purchased stocks will be used in the condition purchased if possible, and otherwise will be sent to refineries, brass mills, or brass ingot makers, depending upon the best method of disposal. Copper ingot and refinery shapes and scrap will be purchased at ceiling prices.

Four separate forms are required from owners of such stocks before disposal can be made through the Copper Recovery Corp. channels. These forms are:

WPB-843-a: Detailed information on inventory of primary copper and copper base alloys still inthe form in which they were received.

WPB-843-b: Detailed information on inventory of non-assembled, partly or completely fabricated copper and copper alloys produced primarily and entirely from a single primary product.

WPB-843-c: Information on all other copper and copper base alloy materials in inventory.

WPB-843-d: An affidavit. This affidavit must be returned with the foregoing reports, and no other form is suitable.

Non-Ferrous Prices

(Cents per lb. for early delivery)

Copper,	Electr	olyti	ic1	0									0					12.00
Copper,	Lake										0 0	0	0			0	0	12.00
Tin, Str	aits. D	iew	You	k							0 0	0	0			0	0	52.00
Zine, Ea																		8.23
Lead, St	. Loui	is3				*				*		*		*		*	*	6.35
1 Min	e pro	due	ers'		q	U	10	t	a	ti	0	n	8		0	n	ly	, de-
livered																		
proving	sen Nr.	N. WWY 7	Van	i.		a	0	3.1	12	01	PR	,	77	30	20	30		2 4 76

livered Conn. Valley. Deduct ¼c. for approximate New York delivery price. Add 0.39c. for New York delivery. Add 0.15c. for New York delivery.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 15c.-16c. a lb.; No. 12 remelt No. 2, standard, 14.50c. a lb. Nickel electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. Antimony. prompt; Asiatic, nominal, New York; American, 14.50c. a lb., fo.b. smelter. Quicksilver, \$197 to \$199 per 76 lb. flask, f.o.b. shipping point. Brass Ingots, commercial \$5-5-5-5, 13.25c. a lb.

THE IRON AGE, June 25, 1942-125

Four New Grades Added To Scrap Schedule

• • • An amendment providing for changes in specifications for certain grades of iron and steel scrap, along with the addition of several grades to those already in revised price schedule No. 4, was announced by OPA. Principal changes in the schedule made by amendment No. 6, effective June 17, 1942, are:

No. 3 bundles, cast steel, tube scrap, and automotive springs and rankshafts are added to the schedule.

Changes are made in the grade specifica-tions already listed.

3. Premiums are established for certain contained alloys.

4. Prices of particular grades are stated in erms of differentials over and under the price f the base grade, No. 1 heavy melting steel.

5. Specific switching charge deductions to be subtracted from basing point prices in computing shipping point prices within basing points have been established in the schedule.

6. A shipping point price of \$15.33 per gross ton has been defined for the base grade (No. 1 heavy melting steel) at all shipping points in New York City and Brooklyn. A 50c. per gross ton loading charge is author-

ized where shipment is by deck scow or rail-road lighter.

7. Louisiana has been made a "remote State," enabling more distant consumers to procure scrap from Louisiana by absorbing a higher freight charge.

To fac litate movement of scrap from northern New England to New England con-sumers, limitations on freight absorptions have been relaxed.

9. A "preparation in transit" privilege has een established for unprepared railroad

The differentials established for the four new grades are: No. 3 bundles, \$2.00 under the base

More scrap news appears on page 120 this week.

grade; cast steel, \$2.50 over the base; tube scrap, \$3.00 over the base; and automotive springs and crankshafts, \$1.00 over the base grade. These differentials apply only to scrap sales for electric furnace, acid open hearth, and foundry use, except for the No. 3 bundles. No. 3 bundles are defined as galvanized sheet scrap or galvanized wire hydraulically compressed into charging box sizes and weighing not less than 75 lb. per cu. ft. Such bundles may not include terneplate or vitreous enameled stock.

Cast steel scrap is all cast steel not over 48 in. long or 18 in. wide, and not over 0.05 per cent phosphorus or sulphur, free of alloys and attachments. It may include heads, gates, and risers. Tube scrap is seamless or welded, not over 0.05 per cent phosphorus and sulphur, and free of alloys. It shall not be more than 18 in. long or 6 in. i.d. It may be mashed or unmashed, and pieces over 6 in. i.d. may be included when thoroughly flattened. The scrap must be new material. Automotive springs and crankshafts must be clean material.

Specification changes of grades already listed in the schedule are:

already listed in the schedule are:

1. No. 2 busheling may now be 16-gage in thickness instead of 12-gage.

2. Maximum phosphorus and sulphur of "low phos" grades raised to 0.05 per cent.

3. Basic open hearths may no longer purchase alloy-free "low phos" and sulphur turnings at a price higher than the maximum for open hearth turnings.

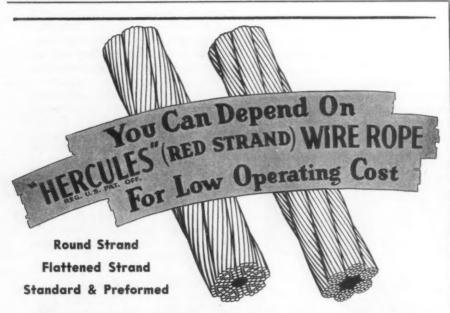
4. Alloy-free "low phos" and sulphur turnings must now come to the consumer direct from the industrial producers.

5. Chemical borings now classed as types No. 1 and No. 2. No. 1 are priced at \$1.00 below the base and may not contain more than 1 per cent oil. No. 2 are priced at \$2.00 below the base and may not contain more than 1.5 per cent oil. An additional 75c, per gross ton is allowed where chemical borings are loaded in box cars instead of gondolas.

No unlisted grades of scrap superior to the base grade may be priced above the base grade price unless approval has been obtained from OPA. Premiums for nickel steel scrap containing 5.25 per cent nickel and under, heretofore covered by price schedule No. 8, have been transferred to schedule No. 4, as revised.

New premiums have been established for certain "low phos" grades containing 0.15 per cent or more molybdenum, and for certain "low phos" grades conforming to specifications SAE 52,100, and sold for electric furnace use.

Portland, Ore., is no longer listed as a basing point, since prices listed for the Portland basing point were identical with "minimum" shipping point prices.



WHY not let "HERCULES" (Red-Strand) Wire Rope help you meet present day production requirements and still maintain a reasonable margin of profit? You will quickly discover that "HERCULES" is a dependable ally-not only in today's fight against increasing operating costs—but also in your endeavor to speed up production.

Made Only By A. LESCHEN & SONS ROPE CO. Established 1857 5909 Kennerly Avenue, St. Louis, Mo.

San Francisco

allowed by the schedule for shipping points in "remote states."

PITTSBURGH-Scrap collections continued to slow up here with additional anxiety being felt over the ability to put scrap for use next winter. Apparently some mills are using up meager scrap supplies so quickly that they may be completely exhausted by mid-July. The exportation of substantial tonnages of "home scrap" in the form of ingots and billets is an additional cause for quick action in increasing substantially the flow of industrial and dealers' scrap. Unless this is done curtailment may be necessary before winter sets in.

Rejections are reaching such a high peak that some sources are wondering if the tail is not wagging the dog in the matter of obtaining scrap for the purpose of winning the war. Some analysts that the pendulum has swung from loose interpretations of scrap regulations to a point where interpretations are so strict on the part of OPA, brokers, and consumers that the real purpose for scrap consumption is being lost sight of.

CHICAGO-A shortage of open hearth scrap has forced one of this district's larger producers to shut down two open hearths this week, with company officials unable to predict when the furnaces will be relighted. It is expected that WPB will make an allocation of scrap to this plant, but this will not correct the basic It will simply serve to shift the emphasis.

By dint of the strenuous efforts of the crap trade, other mills are able to keep all usable open hearths in operation, but most of them are operating with very slim reserves. Stocking for the winter months is not possible under the present rate of scrap shipments.

WPB has recognized the gravity of the situation here and has held meetings, with attendance limited to scrap dealers designed to spur the dealers to still greater efforts.

The steadily increasing flood of turnings from war plants is expected to give rise to a new problem of how to handle such large quantities. Scrap trade authorities here are of the opinion that the cheapest and quickest method would be the use of bundle baling presses, with sheet stock being used to form a container. This practice, however, is not encouraged under present price ceilings, which require that such material be sold at the turnings price, ignoring the extra expenses incurred in the baling operation.

CLEVELAND . - The flow has been lighter at Cleveland and Youngstown. In the latter district 75 out of 83 open hearths are making steel, but the quality of the scrap being received has cut down production. At Cleveland the stocknile of one producer is estimated to be 100,000 tons lower than a year ago, and the amount remaining is equal to only a week's consumption. The cast iron situation is easier, due to the fact that many melters are no longer able to continue on civilian goods production. This will assist the foundries remaining active and in time will lessen the demand for merchant pig iron, indirectly aiding steel

CINCINNATI - Because of the increase in demand for scrap materials in this area, the scrap situation tends to be tighter. While there is yet no acute suffering on the part of consumers, the fact that material is not as plentiful as a few weeks ago is causing some concern among dealers as to the possibility obtaining full fall and winter supplies. Recent amendments to scrap priority schedules are looked upon with favor by the trade, generally.

BUFFALO-In this district, 7301 tons of scrap were collected in May as a result of public supported scrap drives. Auto graveyards furnished an additional 13,718 tons in May, as compared with 7778 tons in April. A civic "Tin for Victory" campaign has been started here with city trucks scheduled to make the house-to-house canvas on Aug. About 10,000 tons of street car rails will be dug up by next October under a plan announced this week by the WPB's salvage section.

BOSTON-Flow of scrap to consuming points is about normal again, the freight car situation having improved during the past few days. Considering all angles, dealers admit railroads have done a remarkably good job. Any scarcity of cars

has been temporary. General opinion of the trade is that latest amendments to the OPA price schedule will not materially alter the New England situation. However, it is felt the marketing of chemical borings has been made more World War I German canworkable. nons in New England towns are finding their way to mills. Salvaging of Boston abandoned street car rails is winding up, with salvaging of curved trackage at street intersections being completed.

ST. LOUIS-Because heavy rains have continued through the past week and because of the preoccupation of farmers with work in the fields, scrap iron collec-tions in this district have fallen off as compared with a week ago. Mills so far have not been affected by the lag in shipments since June 1. Recent changes in the OPA price schedule are regarded favorably. American Steel Foundries Co. this week was allocated 5000 tons of scrap.

PHILADELPHIA -- WPB regional office has asked quick clearance on a government track removal project involving 60,000 tons of trolley rails in 102 New Jersey communities. Cost of removal and repaving will be met by the government, which, through the MRC, holds title to the rail. There are 616 miles of rail, all but 28 of which is imbedded, and it will be sold direct to mills. Scrap deliveries are still held in check pending better understanding of OPA grading rules.

LOW COST—HIGH SPEED

MARVEL

MARVEL 4-B shaper action high speed Hack Saw. Screw-feed. Ball-hearing saw frame. Quickaction vise. Cuts 6" cold-rolled to dekaction vise. its 6" cold-rolled bar in 8 minutes other sizes in proportionate time.

MARVEL

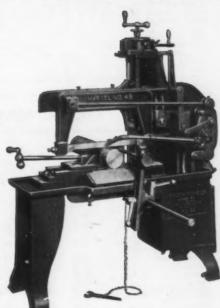
The performance of MARVEL 4-B is high speed cutting with low cost operation because it will out-cut any other saw in its price class. Has draw-cut and life return giving blade longer life. Has accurate, rigid frame action. 6" x 6" capacity and a speed of 149 strokes per minute. MARVEL 4-B may be had with cabinet base and with 4 speeds.

BUY FROM YOUR LOCAL DISTRIBUTORS

Write for Bulletin about these lost machines featuring speed and ficiency.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People" 5700 Bloomingdale Ave. Chicago, U.S.A. Eastern Sales Office: 225 Lafayette St., New York



(All the prices given below are per gross tons and are basing point prices from which shipping point prices and consumer's delivered prices are to be computed)

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

"ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES

					Low Phos			vy Struct and Plate			ut Auto				
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton,	C OPEN HEARTH GRA (No. 1 Heavy Melting; No. 1 Hydr. Com- pressed Black Sheets; No. 2 Heavy Melting; Dealers' No. 1 Bundles; Dealers' No. 2 Bundles; No. 1 Busheling)		Busheling ; Cast	Billet, Bloom, Forge Crops	Bar Crops, Punch- ings, Plate Scrap and Cast Steel	Tube Scrap	3 ft. and Under	2 ft. and Under	1 ft. and Under	3 ft. and Under	2 ft. and Under	1 ft. and Under and Auto, Springs, and Crank- shafts	Alloy free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Steubenville, Warren, Youngstown, Weirton	\$20.00	\$16.00	\$16.00	\$25.00	\$22.50	\$23.00	\$21.00	\$21.50	\$22.00	\$20,00	\$20.50	\$21.00	\$18.00	\$19.50	\$21.00
Cleveland, Middletown,	\$20.00	\$10.00	\$10.00	\$20.00	\$22.00	423.00	421.00	421.00	422.00	420.00	420.00	421.00	\$10.00	410.00	401100
Cincinnati, Portsmouth Chicago, Claymont, Coatesville,	19.50	15.50	15.50	24.50	22.00	22.50	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Conshohocken, Harrisburg, Phoenixville, Sparrows Pt	18.75	14.75	14.75	23,75	21.25	21.75	19.75	20,25	20.75	18.75	19.25	19.75	16.75	18.25	19.78
Ashland, Ky	19.50	15.50	15.50	24.50	22.00	22.50	20.50	21.00	21.50	19.50	20.00		17.50	19.00	20.58
Buffalo, N. Y.	19.25	15.25	15.25	24.25	21.75	22.25	20.25	20.75	21.25	19.25	19.75		17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind	18.25	14.25	14.25	23.25	20.75	21.25	19,25	19.75	20.25	18.25	18.75		16.25	17.75	19.25
Duluth, Minn,	18.00	14.00	14.00	23.00	20.50	21.00	19.00	19.50	20.00	18.00	18,50		16.00	17.50	19.00
Detroit, Mich.	17.85	13.85	13.85	22.85	20.35	20.85	18.85	19.35	19.85	17.85	18.35		15.85	17.35	18.88
Toledo, Ohio	11.00	13.85	13.85												*****
St. Louis, Mo	17.50	13.50	12.50	22.50	20.00	20.50	18.50	19.00	19.50	17.50	18,00		15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala. Birmingham, Los Angeles;	i														
Pittsburg, Cal.; San Francisco	17.00	13.00	13.00	22.00	19.50	20.00	18.00	18.50	19.00	17.00	17.50		15.00	16.50	18.00
Minnegua, Colo	16.50	12.50	12.50	21.50	19.00	19.50	17.50	18.00	18.50	16.50	17.00		14.50	16.00	17.50
Seattle, Wash	14.50	10.50	10.50	19.50	17.00	17.50	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50

BUNDLES consisting exclusively of tin coated material and compressed into charging box size, are \$4 per gross ton below No. 2 dealers' bundles. Bundles containing tin coated material but not composed exclusively of such material (outlawed by order M-24-b) are \$8 below No. 2 dealers' bundles.

NO. 3 BUNDLES: Consists of galvanized sheet scrap and galvanized wire, hydraulically compressed into charging box size, and weighing not less than 75 lb. per cu. ft. Price, \$4 per gross ton less than No. 1 heavy melting scrap.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same distinct ential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

not exceed the prices above for the corresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. Published dock charges prevail, or if unpublished 75c. per ton must be included as part of the deduction.* Shipping by motor vehicle: The scrap is at its shipping points take price listed in table minus lowest switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

*At Memphis deduct 50c.; Great Lakes ports \$1; New England \$1.25.

REMOTE SCRAP: Defined as all grades of scrap listed in table above located in North Dakota, South Dakota, Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana and Utah. Colorado scrap is remote for Colorado consumers only. The delivered price of remote scrap may exceed by more than \$1, but not more than \$5, the price at the basing point nearest the consumer's plant, provided detailed statement under oath is furnished OPA. Where delivered price would exceed by more than \$5 the price at basing point nearest consumer, user must apply to OPA for permission to absorb the additional charges. For exceptions see official order.

UNPREPARED SCRAP: The maximum prices established hereinabove are maximum prices for prepared scrap. For unprepared scrap, maximum prices shall be \$2.50 less than the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order).

Where more than one grade of scrap is included in a shipment, the maximum price of all scrap in the vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed.

CAST IRON BORINGS FOR CHEMICAL USE: No. 1 (new, clean borings containing not more than 1 per cent oil), \$1 less than No. 1 heavy melting steel; No. 2 (new, clean borings containing not more than 1.5 per cent oil), \$2 less than No. 1 heavy melting steel.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of \$2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA, of the shipping point, transportation charges and details of the sale.

RAILROAD SCRAP

(Per gross ton, delivered consumers' plants located on line.)

				Sc	rap Rail	8
	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	3 ft. and Under	2 ft. and Under	18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth,		*******			011401	011001
Middletown	\$20.50	\$21.50	\$23.00	\$23.50	\$23.75	\$24.00
Canton, Pittsburgh, Sharon, Steubenville,						
Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia,	40 90	00 95	00.05	00 95	00.00	
Sparrows Pt., Wilmington, Birmingham, Los Angeles,	19.75	20.75	22.25	22.75	23.00	23.25
San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.7
Detroit	18.85	19.85	21,35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.5
Kansas City, Mo	17.00	18.00	19.50	20.00	20.25	20.5
Kokomo, Ind	19.25	20.25	21.75	22.25	22.50	22.7
Seattle	15.50	16.50	18.00	18.50	18.75	19.0
St. Louis	18.50	19.50	21.00	21.50	21.75	22.0

CAST IRON SCRAP

Other Than Railroad Scrap

	Group A	Group B	Group C
No. 1 machinery cast, drop broken, 150 lbs.			
No. 1 cupola cast	\$18.00	\$19.00	\$20.00
and under	18.00	19.00	20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	17.50	18.50	19.50
Stove Piate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging box size cast	17.00	18.00	19.00
Misc Malleable	20.00	21 00	22 00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switch district of Kansas City, Kan., Mo.

Comparison of Prices

(Advances Over Past Week in Heavy Type; Declines in Italics. Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: June 23, (Cents Per Lb.) 1942	June 16, 1942	May 26, 1942	June 24, 1941	Pig Iron: June 23, June 16, May 26, June 24 (Per Gross Ton) 1942 1942 1942 1941
Hot rolled sheets 2.10 Cold rolled sheets 3.05 Galvanized sheets (24 ga.) 3.50 Hot rolled strip 2.10	2.10 3.05 3.50 2.10	2.10 3.05 3.50 2.10	2.10 3.05 3.50 2.10	No. 2 fdy., Philadelphia. \$25.89 \$25.89 \$25.84 No. 2, Valley furnace 24.00 24.00 24.00 24.00 No. 2, Southern Cin'ti 24.68 24.68 24.68 24.68 No. 2, Birmingham 20.38 20.38 20.38 20.38
Cold rolled strip 2.80 Plates 2.10 Stain's c.r. strip (No. 302) 28.00	2.80 2.10 28.00	2.80 2.10 28.00	2.80 2.10 28.00	No. 2, foundry, Chicago† 24.00 24.00 24.00 24.00 Basic, del'd eastern Pa 25.39 25.39 25.39 25.34 Basic, Valley furnace 23.50 23.50 23.50 Malleable, Chicago† 24.00 24.00 24.00 24.00
Tin and Terne Plate: (Dollars Per Base Box)				Malleable, Valley 24.00 24.00 24.00 24.00 L. S. charcoal, Chicago 31.34 31.34 31.34 31.34
Tin plate	\$5.00 4.30	\$5.00 4.30	\$5.00 4.30	Ferromanganese‡135.00 135.00 135.00 120.00 †The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
Bars and Shapes: (Cents Per Lb.)				‡For carlots at seaboard.
Merchant bars 2.15 Cold finished bars 2.65 Alloy bars 2.70	2.15 2.65 2.70	2.15 2.65 2.70	2.15 2.65 2.70	Scrap: (Per Gross Ton)
Structural shapes 2.10 Stainless bars (No. 302) 24.00	$\frac{2.10}{24.00}$	$\frac{2.10}{24.00}$	$\frac{2.10}{24.00}$	Heavy melt'g steel, P'gh.\$20.00 \$20.00 \$20.00 \$20.00 Heavy melt'g steel, Phila. 18.75 18.75 18.75
Wire and Wire Products: (Cents Per Lb.)				Heavy melt'g steel, Ch'go 18.75 18.75 18.75 No. 1 hy. comp. sheet, Det. 17.85 17.85 17.85 Low phos. plate, Youngs'n 22.50 22.50 23.00
Plain wire 2.60 Wire nails 2.55	$\frac{2.60}{2.55}$	$\frac{2.60}{2.55}$	$\frac{2.60}{2.55}$	No. 1 cast, Pittsburgh 20.00 20.00 20.00 22.00 No. 1 cast, Phila 20.00 20.00 20.00 24.00
Rails: (Dollars Per Gross Ton)				No. 1 cast, Ch'go 20.00 20.00 20.00 20.00
Heavy rails\$40.00 Light rails 40.00	\$40.00 40.00	\$40.00 40.00	\$40.00 40.00	Coke, Connellsville: (Per Net Ton at Oven)
Semi-Finished Steel: (Dollars Per Gross Ton)				Furnace coke, prompt \$6.00 \$6.00 \$6.00 \$6.125 Foundry coke, prompt 6.875 6.875 6.875
Rerolling billets \$34.00 Sheet bars 34.00 Slabs 34.00 Forging billets 40.00	\$34.00 34.00 34.00 40.00	\$34.00 34.00 34.00 40.00	\$34.00 34.00 34.00 40.00	Non-Ferrous Metals: (Cents per Lb. to Large Buyers)
Alloy blooms, billets, slabs 54.00 Wire Rods and Skelp:	54.00	54.00	54.00	Copper, electro., Conn 12.00 12.00 12.00 12.00 Copper, Lake, New York 12.00 12.00 12.00 12.00 Tin (Straits), New York 52.00 52.00 52.00 52.75
(Cents Per Lb.) Wire rods 2.00 Skelp (grvd) 1.90	2.00 1.90		2.00 1.90	Zinc, East St. Louis

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 130 to 136 herein.

. . . Composite Prices

	FINISHED STE	EEL	PI	G IRON		SCR	AP	STEEL	
June 16, 19	422.304676	. a Lb	\$23.61	a Gross Ton		\$19.17	a (Gross Ton	
One week a	ago2.304676	a Lb	\$23.61	a Gross Ton		\$19.17	a (Gross Ton	
One month	ago2.304676	. a Lb	\$23.61	a Gross Ton		\$19.17	a (Gross Ton.	
One year a	go2.304676	a Lb	\$23.61	a Gross Ton		\$19.17	a (Gross Ton	
	HIGH	LOW	HIGH	LOW	,	HIGH		LOW	
1942	2.30467c.,	2.30467c.,	\$23.61	\$23.61		\$19.17		\$19.1	
1941	2.30467c.,	~ ~ ~ · · · ·		20 \$23.45, Jan.	2	\$22.00, Jan.	7	\$19.17, Ap	
1940		2.24107c., Apr. 16		23 22.61, Jan.		21.83, Dec.	30	16.04. Ar	
1939		2.26689c., May 16	22,61, Sept.	19 20.61, Sept		22.50, Oct.		14.08. Ma	
1938		2.27207c., Oct. 18		21 19.61. July		15.00, Nov.		11.00, Ju	w
1937		2.32263c., Jan. 4	23.25, Mar.	9 20.25, Feb.		21.92, Mar.		12.92. No	
1936		2.05200c., Mar. 10		24 18.73, Aug		17.75, Dec.	-	12.67. Ju	
1935		2.06492c., Jan. 8	18.84, Nov.	5 17.83, May		13.42, Dec.		10.33, Ar	
1934	2.15367c., Apr. 24		17.90, May	1 16.90, Jan	-	13.00. Mar.			
1933	1.95578c., Oct. 3		16.90. Dec.	5 13.56, Jan.				9.50, Se	
						12.25, Aug.		6.75, Ja	_
1932 1931		1.83901c., Mar. 1	14.81, Jan.	,		8.50, Jan.		6.43, Ju	
		1.86586c., Dec. 29	15.90, Jan.			11.33, Jan.		8.50, De	
1930		1.97319c., Dec. 9	18.21, Jan.	7 15.90, Dec.		15.00, Feb.		11.25, De	
1929		2.26498c., Oct. 29		14 18.21, Dec.		17.58, Jan.		14.08, De	
	bars, beams, tan black pipe, hot a and strip, represe the United State	ex based on steel k plates, wire, rails, nd cold-rolled sheets enting 78 per cent of es output. Index re- ug. 28, 1941, issue.	at Valley furna at Chicago, F	erages for basic ces and foundry hiladelphia, Bu thern iron at Ci	iron	Based on a steel scrap quat Pittsburgh, cago.	otati	ions to con	sumers

Prices of Finished Iron and Steel.

Steel prices shown here are f.o.b. basing points, in cents per ib., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

												10	DELI	VEREI	OT O
Basing Point Product	Pitts- burgh	Chicago	Gary		Birm- ingham	Buffalo	Youngs-	Spar- rows Point	Granite City	Middle- town. Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphi
SHEETS Hot rolled	2.10¢	2.10€	2.10 €	2.10¢	2.10€	2.10€	2.10€	2.10¢	2.20€	2.10¢		2.65¢	2.22€	2.35¢	2.28
Cold rolled ¹	3.05€	3.05€	3.05¢	3.05€		3.05€	3.05€		3.15€	3.05€		3.70€	3.17¢	3.41€	3.39¢
Galvanized (24 ga.)	3.50€	3.50€	3.50 €		3.50€	3.50€	3.50€	3.50¢	3.60€	3.50€		4.05€		3.75€	3.686
Enameling (20 ga.)	3.35€	3.35€	3.35€	3.35€			3.35€		3.45€	3.35€		4.00¢	3.47€	3.73€	3.696
Long ternes ²	3.80€		3.80¢									4.55¢		4.18€	4.14¢
STRIP Hot rolled ³	2.10€	2.10€	2.10€	2.10€	2.10€		2.10€			2.10€		2.75¢	2.22¢	2.48€	
Cold rolled4	2.80€	2.90€		2.80 €			2.80€	(Wor	cester = 3	.00¢)			2.92€	3.18€	
Cooperage stock	2.20€	2.20€			2.20€		2.20€							2.58∉	
Commodity C-R	2.95€			2.95€			2.95€	(Wor	cester = 3	.35¢)			3.07∉	3.33¢	
TIN PLATE Standard cokes, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.38¢	5.34
BLACK PLATE 29 gage ⁸	3.05∉	3.05¢	3.05€						3.15∉			13 4.05¢			3.39
TERNES, M'FG. Special coated, base box	\$4.30	\$4.30	\$4.30						\$4.40						
BARS Carbon steel	2.15€	2.15€	2.15€	2.15€	2.15¢	2.15€		(Du	luth =2.	25¢)	2.52€	2.80€	2.27¢	2.51∉	2.49
Rail steel ⁶	2.15¢	2.15¢	2.15€	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet)7	2.15€	2.15€	2.15¢	2.15€	2.15¢	2.15€	2.15€	2.15€			2.52¢	2.55€	2.27 €	2.40¢	
Reinforcing (rail)7	2.15€	2.15€	2.15€	2.15¢	2.15€	2.15€	2.15€				2.52¢	2.55€	2.27€		2.49
Cold finished®	2.65€	2.65€	2.65€	2.65€		2.65€			(Detroit	=2.70¢)				3.01 €	2.99
Alloy, hot rolled	2.70€	2.70∉	~			2.70¢	(B	ethlehe	m, Massi	lon, Can	ton =2.	70¢	2.82∉		-
Alloy, cold drawn	3.35€	3.35€	3.35€	3.35€		3.35€							3.47¢		
PLATES Carbon steel	2.10€	2.10€	2.10€	2.10€	2.10¢		2.10€		tesville s		mont = 2 2.47¢	2.65¢	2.27∉	2.30€	2.158
Wrought iron	3.80∉														-000 TO 000 TO 00
Floor plates	3.35€	3.35∉									3.72¢	4.00€		3.73€	3.69
Alloy	3.50€	3.50€			(Coat	esville =	3.50¢)				3.97€	4.15¢		3.71€	3.60
SHAPES Structural	2.10€	2.10€	2.10¢		2.10∉	2.10¢	(1	3ethlehe	m =2.10	¢)	2.47€	2.75¢		2.28€	2.22
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80€			2.80¢			(Wor	ester = 3	3.00∉)						
0.51 to 0.75 Carbon	4.30€			4.30¢			(Word	cester = 4	1.50¢)	- 11					
0.76 to 1.00 Carbon	6.15∉			6.15€			(Wor	cester = 6	3.35¢)						
1.01 to 1.25 Carbon	8.35¢			8.35∉			(Wor	cester =	8.55¢)						
WIRE ⁹ Bright 15	2.60e	2.60€		2.60€	2.60¢		(Wor	cester=	2.70¢)			3.10¢			2.94
Galvanized				add pr	oper size	e extra	and galv	anized	extra to	bright	wire ba	se, above	2.		
Spring (High Carbon)	3.20€	3.20€		3.20€			(Wor	cester =	3.30¢)			3.70€			3.54
PILING Steel sheet	2.40€	2.40€				2.40€						2.95€			2.74
IRON BARS12															
Wrought single refined	4.40€								Ī						
Wrought double refined	5.40¢								1						

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.45 per cent and less. ⁵ Applies to certain width and length limitations. ⁶ For merchant trade. ⁷ Prices for straight length material only, from a producer to a consumer. Functional discount of 25c, per 100 lb. to fabricators. ⁶ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lot to manufacturing trade. ¹⁰ These prices do not apply if the customary means of transportation (rail and water) are not used. ¹¹ Ship plates only. ¹² Common from bars quoted at 2.15c, by Terre Haute, Ind. producer. ¹³ Boxed. ¹⁴ Portland and Seattle price, San Francisco price is 2.50c. ¹⁵ This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

HAND FINISHING A ZINC ALLOY

STAMPING DIES

GALVAN-IZING

HULL PLATES

RUBBER

PAINT

BRASS

CERAMICS

DIE

CASTING PHARMA-

CEUTICALS

METAL SPRAYING

This is just another instance of a peace-time development of zinc being turned to obtain all of the zinc products they would like to have. users of zinc may not be able to obtain all of the zinc products they would like to have. THE NEW JERSEY

ZINC COMPANY

HORSE HEAD ZINC PRODUCTS

steel. Thus zinc is playing an important role in helping the airce of limited airce.

tages in the production of stamping dies.

factors contribute to longer production life, thereby cutto in the instance of a neace-time development

SPEEDING PLANE PRODUCTION

Sand cast dies of zinc alloy are used for stamping many sheet metal aircraft parts.

Sand cast dies of zinc alloy are used for stamping many sheet metal aircraft parts. Sand cast dies of zinc alloy are used for stamping many sheet metal aircraft parts.

Steel. Thus zinc is playing an important role in helping the aircraft industry to meet This procedure saves time and money over the practice of machining dies from tool the demand of our fighting forces for "More Planes—Sooner",

Dies of unalloyed sinc were used in the days of limited aircraft production. But Dies of unalloyed zinc were used in the days of limited aircraft production. But the days, provides additional advanlarger production has proved that a zinc alloy, originally developed for the die cast.

ages in the production of stamping dies.

Zamak, provides additional advan.

The physical advantages of Samping dies, smoother surfaces and increased wear resistance. All of these The physical advantages of Zamak alloy dies include greater strength and hardfactors contribute to longer production life, thereby cutting down the number of ness, less warpage, smoother surfaces and increased wear resistance. All of these factors mean faster production.

This is just another instance of a peace-time development of zinc being turned to why civilian

NG OF THE DIES

DETERMINING FURTHER FINIS

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Spar-rows Point (rerolling only). Prices de-livered Detroit are \$2.25 higher; f.o.b. Duluth, billets only, \$2 higher.

													oss Ton
Rerolling													
Forging	quality			*	-	*		×	*	*		*	40.00

Shall Steel

														P	e	30	6	7	ro	088	T	on	į
3	in.	to	12	in.																\$5	2.	00	į
12																							
18																							
				n																			
Pitt	dat	urg	h, (Chic	8.	30),	B	tu	ıf	TE	ıl	0		G	a	r	y	r.	Cl	ev	re-	
lane																							
			de	elive	F	96	ì	1	D	e	t	ro	ì	t		2	11	76	9	\$	2.	25	
high	her																						

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity.

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point,

AND CAL				7	2	a	***	Ton
_								
Open	hearth	or	bessemer				. \$3	4.00

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared . . 1.90c.

Wire Rods

(No.	5	to	9/	22	192.

	3						Ť							F	er Lb.
Pittsburgh,															
Worcester,	B	Ia	1.8	S					×						2.10c.
Birminghan	n								×						2.00c.
San Franc	is	ec)												2.50c.
Galveston			×							*		×			2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills (F.o.b. Pittsburgh only on wrought pipe) Base Price—\$200 per Net Ton

Steel (Butt Weld)

1 to 3 in	68 1/2	57 1/2
Wrought Iron (Butt Wel	d)	
½ in. ¾ in. 1 and 1¼ in. 1 in. 2 in.	24 30 34 38 37 ½	3 ½ 10 16 18 ½ 18
Steel (Lap Weld) 2 in. 2½ and 3 in. 3½ to 6 in.	61 64 66	49 ½ 52 ½ 54 ½
Wrought Iron (Lap Weld	1)	
2 in	$\begin{array}{c} 30\frac{1}{2} \\ 31\frac{1}{2} \\ 33\frac{1}{2} \\ 32\frac{1}{2} \end{array}$	12 14 1/2 18 17

Ste	eel	(1	B	и	t	t,	e	X	t	7	a	t	8	t	r	0	PI	g,	plain	ends)
1/6	in.														-				Black 61 1/6	Galv. 50 1/2
3/4	in.																		65 1/2	54 1/2

1 to 3 in. 67 57

Wro	oug	ht	Iro	n	(:	Sa	m	e	a	8 .	Above)	
1/2 i	n.										25	6
3/4 1	n.										31	12
1 to	2	in.									38	194
Stee	el (La	p,	ex	tr	a	si	re	on	g	plain	ends
											59	481
2 in 2 1/2	and	d 3	in								59 63 66 1/2	48 1/ 52 1/

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Mailemble	Lew Phos- phorus	Charocal
loston††	\$25.53	\$25.03	\$26.53	\$26.03		
lrooklyn	27.65			28.15		4 4 + 4 4
ersey City	26.62	26.12	27.62	27.12		****
Philadelphia	25.89	25.39	26.89	26.39		
lethichem, Pa.	\$25.CO	\$24.50	\$26.00	\$25.50		
verett, Mass, ††	25.00	24.50	26.00	25.50		
wedeland, Pa.	25.00	24.50	26.00	25.50		
teelton, Pa		24.50			\$29.50	
lirdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	
parrows Point, Md.	25.00	24.50				
	24.00	23.50	25.00	24.50		
rie, Pa. leville Island, Pa.	24.00	23.50	24.50	24.00		*****
	24.00	23.50	24.50	24.00		
harpsville, Pa.*			25.00	24.50	20 50	*****
uffalo	24.00	23.00	25.00		29.50	44449
incinnati	24.68	24.68	11111	25.18	*****	
Canton, Ohie	25.47	24.97	25.97	25.47		
Aansfield, Ohio	26.06	25.56	26.56	26.06	****	
t. Louis	24.50	24.00				
hicago	24.00	23.50	24.50	24.00		\$31.3
Granite City, III.	24.00	23.50	24.50	24.00		
leveland	24.00	23.50	24.50	24.00		
lamilton, Ohio	24.00	23.50	1	24.00		
oledo	24.00	23.50	24.50	24.00		
oungstown*	24.00	23.50	24.50	24.00		
	24.00	23.50	24.50	24.00		
ake Superior fc	1					\$28.00
	>>>+	****	****			33.00
yles, Tenn. fc.†	00.00		27.26	26.76		1
t. Paul	26.76	*****				
Duluth	24.50	1	25.00	24.50	*****	*****
Sirmingham		19.00	25.00	*****		****
os Angeles	27.25					****
an Francisco	27.25					
eattle	27.25					
rovo, Utah	22.00	1				
Anntreal	27.50	27.50		28.00		
Toronto	25.50	25.50	1	26.00		

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.
†Price shown is for low-phosphorous iron; high-phosphorous sells for \$28.50 at the furnace.
††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at \$1 per gross ton above maximum prices.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade (1.75 per cent to 2.25 per cent). Phosphorous Differential: Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

Manganese Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

Wrought Iron (Same as Above)

2	ir	1.										331/2	154
2	1/2	to	4	1	in.				*	*		39	221
4	1/2	to		6	in.				*	*		371/2	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card. F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

CAST IRON WATER PIPE

							t Ton
6-in.	and	larger,	del'd	Chica	ago		54.80
6-in.	and	larger,	del'd	New	York		52,20
6-in.	and	larger,	Birm	ingha	m .		46.00
6-in.	and	d large	r f.c	b. c	ars.	Sar	3
Fr	ancis	sco or 1	Los A	ngele	S		69.40
6-in	and	larger	foh	core	Sont	tlo	71 20

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago. \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle.

FUEL OIL

No.	3	f.o.b.	Bayonr	ie, N.	J			.5.20c
No.	6	f.o.b.	Bayon	ne, N	. J			4.285c
No.	6	Bur.	Stsd., d	lel'd (Chicas	20		4.75c
No.	3	distill	ate del'	d Cle	veland	1		.6.50c
No.	4	indus.	, del'd	Cleve	eland			.6.00c
No.	5	indus.	, 'del'd	Cleve	eland			.5.25c
No.	6	indus.	del'd	Cleve	land			. 5.25c.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Per 1000
Super-duty brick, St. Louis\$64.60
First quality, Pennsylvania, Mary-
land, Kentucky, Missouri and
Illinois 51.30
First quality, New Jersey 56.00
Second quality, Pennsylvania, Mary-
land, Kentucky, Missouri and
Illinois
Second quality, New Jersey 51.00
No. 1, Ohio 43.00
Ground fire clay, net ton 7.60

Silica Brick

T																
Pennsylvania																
Chicago Disti	rict															58.90
Birmingham			*										*	*		51.30
Silica cement.	net	1	to)1	1	(E	a	S	t	e	rı	n)		9.00

Chrome Brick

Standard, f.o.b. Baltimore, Plym-
outh Meeting and Chester\$54.00
Chemically bonded, f.o.b. Baltimore,
Plymouth Meeting and Chester
Pa 54.00

Magnesite Brick

Grain Magnesite

Domestic, f.o.b.	Baltimore and Ches-	
	(carloads) \$4	4.00
Domestic, f.o.b.	c. Chewelah, Wash.	0 00
(in bulk)		2.00

ALIONIA DRAW BLUGHES

meet every production demand of Today and Tomorrow

tranders Veright 50,000 th. Pract Boach—time proved for floor pendution to terrous and mofernous service. When you join Vaughn dependability with Vaughn Draw Bench performance, you get a combination of advantages that is priceless now—and of inestimable value to you in the future. Let's check the facts together!



Sectial Vaughn Draw Banch for drawing takes, bars or special takes—four at a time

Patents applied for

THE VAUGHN MACHINERY COMPANY

CUYAHOGA FALLS, OHIO, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT...CONTIN-UOUS OR SINGLE HOLE...FOR THE LARGEST BARS AND TUBES...FOR THE SMALLEST WIRE...FERROUS, NON-FERROUS

MATERIALS OR THEIR ALLOYS

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chrom	ium-N	Vickel	Alloys

No. 304	No. 302
Forging billets21.25c.	20.40c.
Bars25.00c.	24.00c.
Plates29.00c.	27.00c.
Structural shapes25.00c.	24.00c.
Sheets	34.00c.
Hot rolled strip23.50c.	21.50c.
Cold rolled strip30.00c.	28.00c.
Drawn wire25.00c.	24.00c.

Straight-Chromium Alloys

No. 410 No. 430 No. 442 No. 446 F.Billets 15.725c.16.15c.19.125c.23.375c. Bars ...18.50c. 19.00c. 22.50c. 27.50c. Plates . .21.50c. 22.00c. 25.50c. 30.50c. Sheets .26.50c. 29.00c. 32.50c. 36.50c. Hotstrip 17.00c. 17.50c. 24.00c. 35.00c. Cold st..22.00c. 22.50c. 32.00c. 52.00c.

Chromium-Nickel Clad Steel (20%)

											NO. 304
Plates											18.00c.*
Sheets											19.00c.

^{*}Includes annealing and pickling. '

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

															Per Lb.
Field grade					0		0		0		0	0.	0		3.20c.
Armature .								*				*	*		3.55c.
Electrical .															4.05c.
*Motor															
*Dynamo															5.65c.
Transformer			7	2											6.15c.
Transformer	P	(35	5											7.15c.
Transformer															7.65c.
Transformer	r	10	52	2											

F.o.b. Granite City, add 10c. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, per Package of 112 Sheets)

	* 40,4600	,0 0, 1	THE WILLOW	,
0.11		* 0	20x14 in.	20x28 in
	coating			\$12.00
	coating			14.00
20-lb.	coating	I.C	7.50	15.00
25-lb.	coating	I.C	8.00	16.00
30-lb.	coating	I.C	8.63	17.25
40-lb.	coating	I.C	9.75	19.50

BOLTS, NUTS, RIVETS, SET SCREWS Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birming-ham or Chicago)

Per Cent off List

Machine and Carriage Bolts:

61/2 in., shorter and smaller651/2
6 x % in., and shorter63 1/2
6 in. by ¾ to 1 in. and shorter.61
11/8 in. and larger, all length59
All diameters over 6 in. long 59
Lag, all sizes62
Plow bolts65

Nuts, Cold Punched or Hot Pressed:

		(He	<i>xaga</i>	n or	Squ	ıa	2"(е,)			
1/2	in.	and	sma	aller.								62
9/1	16 t	0 1	in.	inclu	sive							59
11/8	to	11/2	in.	incl	usiv	re						57
1 5%	in	an	d la	roer								56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.	
7/16 in, and smaller		64	
½ in. and smaller	62		
½ inthrough 1 in		60	
9/16 to 1 in	59		
116 in through 116 in	57	58	

In full container lots, 10 per cent addi- tional discount.
Stove bolts, packages, nuts loose
71 and 10
Stove bolts in packages, with nuts
attached71
Stove holts in hulk 80

1% in. and larger.... 56

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets

(1/2 in. and larger)

Small Rivets

(7/16 in. and smaller) Per Cent Off List F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham65 and 5

Cap and Set Screws

Per Cent Off L	ist
Upset hex. head cap screws U.S.S.	
or S.A.E. thread, 1 in. and	
smaller	60
Upset set screws, cup and oval	
points	68
Milled studs	40
Flat head cap screws, listed sizes	30
Filister head cap, listed sizes	46
Freight allowed up to 65c, per 100	lb.

based on Cleveland, Chicago or New York on lots of 200 lb. or over.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

Ciocolana, Dirininginani,
Base per Keg
Standard wire nails\$2.55
Coated nails 2.55
Cutnails, carloads 3.85
Base per 100 Lb.
Annealed fence wire\$3.05
Annealed galvanized fence wire. 3.40
Base Column
Woven wire fence* 67
Fence posts (carloads) 69
Single loop bale ties 59
Galvanized barbed wiret 70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

Twisted barbless wire.....

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes Minimum Wall (Net base prices per 100 ft., f.o.b. Pitts-burgh, in carload lots)

Seamless Weld, Cold Hot Hot Drawn Rolled Rolled

2 in. o.d. 13 B.W.G. 15.03 13.04 12.38 2½ in. o.d. 12 B.W.G. 20.21 17.54 16.58 3 in. o.d. 12 B.W.G. 22.48 19.50 18.35 3½ in. o.d. 11 B.W.G. 28.37 24.62 23.15 4 in. o.d. 10 BW.G. 35.20 30.54 28.66

111. U.u. 10 DW.G. 00.20 00.04 20	000
(Extras for less carload quantities)
40,000 lb. or ft. over	ase
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft. 1	0%
10,000 lb. or ft. to 19,999 lb. or ft. 2	0%
5,000 lb. or ft. to 9,999 lb. or ft. 3	0%
2,000 lb. or ft. to 4,999 lb. or ft. 4	5%
Under 2 000 lb or ft 6	50%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b Pittsburgh District and Lorain, Ohio, Mills (F.o.b. Pittsburgh only on wrought pipe) Base Price-\$200 per Net Ton

Black

Galv

55

54 1/2

Steel (Butt Weld)

1 to 3 in	68 1/2	57 1/2
Wrought Iron (Butt We	eld)	
½ in	24	31/2
3/4 in	30	10
1 and 11/4 in	34	16
1½ in	38	181/2
2 in	371/2	18
Steel (Lap Weld)		
2 in	61	491/2
2½ and 3 in	64	52 1/2
	100.000	

3½ to 6 in.....

Wrought	Iron	(L	a	Į)	1	V	eld)	
2 in									301/2	12
21/2 to 31	½ in								311/2	141/2
4 in									33 1/2	18
41/2 to 8									321/2	17

Steel (Butt, extra strong, plain ends)

									Black	Galv.
1/2	in.								611/2	50 1/2
3/4	in.								65 1/2	541/2
1	to 3	in							67	57
-			-			_				

Wrought Iron (Same as Above)

1/2	ir	1.									25	6
3/4	ir	1.									31	12
1	to	2	ir	1.							38	19 1/2

Steel (Lap, extra strong, plain ends) 2 in. . 481/2 59 2½ and 3 in..... 63 52 1/2 3½ to 6 in.....

Wrought Iron (Same as Above)

2 in									331/2	151/2
21/2	to	4	in.						39	221/2
41/2	to	6	in.						371/2	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card. F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

CAST IRON WATER PIPE

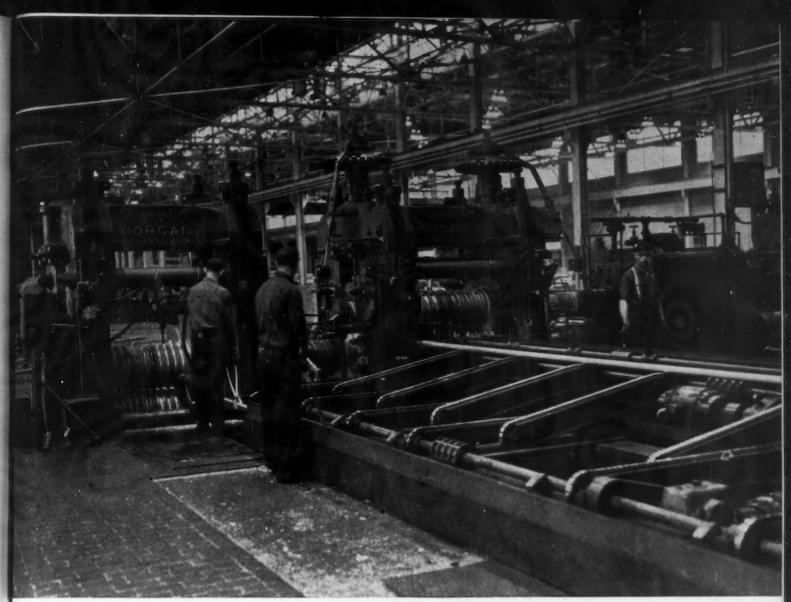
Per Net Ton 6-in. and larger, del'd Chicago. \$54.80 6-in. and larger, del'd New York 52.20 6-in. and larger, Birmingham. 46.00 6-in. and larger f.o.b. cars, San Francisco or Los Angeles... 69.40 6-in. and larger f.o.b. cars Scattle, 71.20

6-in. and larger f.o.b. cars Seattle 71.20

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago. \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle.

FUEL OIL

No.	3	f.o.b.	Bayon	ne.	N.	J		5.2	Oc.
		f.o.b.							
No.	6	Bur. S	tsd., d	el'd	Ch	icag	0.	4.7	5e.
No.	3	distilla	te del	'd C	lev	elan	d	6.5	Oc.
No.	4	indus.	, del'd	Cl	eve	land		6.0	θc.
No.	5	indus.,	del'd	Cle	vel	and.		.5.2	5с.
No.	6	indus.,	del'd	Cle	vel	and.		.5.2	5c.



BUILT BY Engineering

ROLLING ALUMINUM FOR DEFENSE

● Among the many types of mill equipment built by Morgan, is the above mill consisting of two 22" and two 18" 3-high stands driven by one 22" 3-high and one 18" 3-high pinion stand, for rolling aluminum shapes. With this installation was furnished three oil hydraulic cropping and cutting-off shears to handle up to 5" x 5" aluminum billets. On such equipment for maximum production, the rugged stability of Morgan Engineering is well established, long since proved by the largest producers.

DESIGNERS - MANUFACTURERS - CONTRACTORS

BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS ELECTRIC TRAVELING CRANES • CHARGING MACHINES INGOT STRIPPING MACHINES • SOAKING PIT CRANES ELECTRIC WELDED FABRICATION • LADLE CRANES STEAM HAMMERS • STEAM HYDRAULIC FORGING PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

THE MORGAN ENGINEERING CO., Alliance, Ohio Pinsburgh, 1420 Oliver Building

THE MORGAN ENGINEERING CO.
ALLIANCE, OHIO Pittsburgh, 1420 Oliver Bldg.

, Entroy	LLOYS	(F.o.b. Mill) Standard rails, heavier than 60
	S:1: - M	lb., gross ton\$40.0
erromanganese	Silico-Manganese (Per Gross Ton, Delivered, Lump Size,	Angle bars, 100 lb 2.70
o.b. New York, Philadelphia,	Bulk. on Contract)	(F.o.b. Basing Points) Per Gross Too Light rails (from billets)\$40.0
Baltimore, Mobile or New	3 carbon\$113.00*	Light rails (from rail steel)39.0
Orleans, Domestic, 80%, per gross ton (carloads)\$135.00	2.50 carbon 118.00*	Dans wan II
gross ton (carloads)	2 carbon	Cut spikes 3.00c
	1 carbon	Screw spikes 5.15c
piegeleisen	Other Ferroalloys	Tie plates, steel 2.15c
Per Gross Ton Furnace	Ferrotungsten, per lb. con-	Tie plates, Pacific Coast 2.300 Track bolts 4.750
Domestic, 19 to 21%\$36.00 Domestic, 26 to 28% 49.50	tained W, del'd carload \$2.00	Track bolts, heat treated, to
Jomestic, 26 to 28% 49.50	Ferrotungsten, 100 lb. and less 2.25	railroads 5.000
	Ferrovanadium, contract, per	Track bolts, jobbers discount63-
Electric Ferrosilicon	lb. contained V, del'd \$2.70 to \$2.90†	Posing Points light nells Ditt-house
(Per Gross Ton, Delivered Lump Size)	Ferrocolumbium, per lb. con-	Basing Points, light rails—Pittsburgh Chicago, Birmingham; spikes and ti
0% (carload lots, bulk)\$74.50	tained Cb, f.o.b. Niagara	Chicago, Birmingham; spikes and ti plates—Pittsburgh, Chicago, Portsmoutl Ohio, Weirton, W. Va., St. Louis, Kansa City, Minnequa, Colo., Birmingham an Pacific Coast ports; tie plates alone-
0% (ton lots, packed) 87.00	Falls, N. Y., ton lots \$2.25†	City, Minnegua, Colo., Birmingham an
75% (carload lots, bulk)135.00	Ferrocarbontitanium, 15-18 Ti,	Pacific Coast ports; tie plates alone-
75% (ton lots, packed)151.00	7-8 C, f.o.b. furnace, carload contract, net ton\$142.50	Steelton, Pa., Buffalo; spikes alone- Youngstown, Lebanon, Pa., Richmond.
	Ferrocarbontitanium, 17-20 Ti,	roungstown, nebanon, ra., memmona.
ilman Inon	3-5 C, f.o.b. furnace, carload	FLUORSPAR
ilvery Iron (Per Gross Ton, base 6.00 to 6.50 Si)	contract, net ton\$157.50	Fire Clay Brick Per Net To
F.o.b. Jackson, Ohio\$29.50*	Ferrophosphorus, electric or	Domestic washed gravel, 85-5
Buffalo30.75*	blast furnace material, car-	f.o.b. Kentucky and Illinois
For each additional 0.50% silicon add	loads, f.o.b. Anniston, Ala.,	mines, all rail\$25.0
1 a ton. For each 0.50% manganese over % add 50c. a ton. Add \$1 a ton for	for 18%, with \$3 unitage	Domestic, f.o.b. Ohio River land-
.75% phosphorus or over.	freight, equaled with Rock- dale, Tenn., gross ton \$58.50	ing barges 25.0
*Official OPA price established June	Ferrophosphorus, electrolytic	No. 2 lump, 85-5 f.o.b. Kentucky
4, 1941.	23-26%, carlots, f.o.b. Mon-	and Illinois mines 25.0
n n	santo (Siglo), Tenf., \$3 unit-	Foreign, 85% calcium fluoride,
Bessemer Ferrosilicon	age, freight equalized with	not over 5% Si, c.i.f. Atlantic ports, duty paidNoming
Prices are \$1 a ton above Silvery Iron quotations of comparable analysis.	Nashville, gross ton \$75.00	Domestic No. 1 ground bulk, 95
to the contract of the contrac	Ferromolybdenum, per lb, Mo,	to 98%, calcium fluoride, not
	f.o.b. furnace 95c.	over 2½% silicon, f.o.b. Illi-
Ferrochrome	Calcium molybdate, per lb.	nois and Kentucky mines\$34.0
(Per Lb., Contained Cr, Delivered Car-	Mo., f.o.b. furnace 80c. Molybdenum oxide briquettes	As above, in bags, f.o.b. same
lots, Lump Size, on Contract)	10 70 35	mines 36.4
4 to 6 carbon	36 6 1 T 1-41 D- 00-	DEED A CYCDUES
1 carbon	Malab January and de in some mon	REFRACTORIES
0.10 carbon	lb. contained Mo, f.o.b. Lan-	(F.o.b. Works)
0.06 carbon23.00c	geloth, and Washington, Pa. 80c.	Fire Clay Brick Per 100
	*Spot prices are \$5 per ton higher.	Super-duty brick, St. Louis\$64.6
Spot prices are 4c. per lb. of contained	†Spot prices are 10c. per lb. of con-	First quality, Pennsylvania, Maryland, Kentucky, Missouri
chromium higher.		maryland, Kentucky, Missouli
	tained element higher.	and Illinois 51
	tained element higher.	and Illinois 51.3
	tained element higher.	and Illinois
		and Illinois
0	RES	and Illinois 51. First quality, New Jersey 56. Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 46.
		and Illinois
ake Superior Ores (51.50% Fe.) (Delivered Lower Lake Ports)	RES Brazilian, 46-48 Mn67c. to 68c. Cuban, 51 Mn81c.	and Illinois
ake Superior Ores (51.50% Fe.) (Delivered Lower Lake Ports) Per Gross Ton	RES Brazilian, 46-48 Mn67c. to 68c. Cuban, 51 Mn81c. Per Short Ton Unit	and Illinois
ake Superior Ores (51.50% Fe.) (Delivered Lower Lake Ports) Per Gross Ton old range, bessemer, 51.50\$4.75	RES Brazilian, 46-48 Mn67c. to 68c. Cuban, 51 Mn81c. Per Short Ton Unit Tungsten, Chinese, Wolframite,	and Illinois
ake Superior Ores (51.50% Fe.) (Delivered Lower Lake Ports) Per Gross Ton ld range, bessemer, 51.50\$4.75 ld range, non-bessemer, 51.50. 4.60	RES Brazilian, 46-48 Mn67c. to 68c. Cuban, 51 Mn81c. Per Short Ton Unit Tungsten, Chinese, Wolframite, duty paid, delivered\$24 to \$26	and Illinois
take Superior Ores (51.50% Fe.) (Delivered Lower Lake Ports) Per Gross Ton Id range, bessemer, 51.50\$4.75 Id range, non-bessemer, 51.50. 4.60 [esaba, bessemer, 51.504.60	RES Brazilian, 46-48 Mn67c. to 68c. Cuban, 51 Mn81c. Per Short Ton Unit Tungsten, Chinese, Wolframite, duty paid, delivered\$24 to \$26 Tungsten, domestic scheelite, at	and Illinois
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ake Superior Ores (51.50% Fe.) (Delivered Lower Lake Ports) Per Gross Ton Id range, bessemer, 51.50\$4.75 Id range, non-bessemer, 51.504.60 Idesaba, bessemer, 51.504.60 Idesaba, non-bessemer, 51.504.50 Idesaba, non-bessemer, 51.504.35	RES Brazilian, 46-48 Mn67c. to 68c. Cuban, 51 Mn81c. Per Short Ton Unit Tungsten, Chinese, Wolframite, duty paid, delivered\$24 to \$26 Tungsten, domestic scheelite, at mine\$24.00 to \$25.00 Chrome ore, lump, c.i.f. Atlantic	and Illinois
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nke Superior Ores (51.50% Fe.) (Delivered Lower Lake Ports) Per Gross Ton ld range, bessemer, 51.50\$4.75 ld range, non-bessemer, 51.504.60 lesaba, bessemer, 51.504.45 igh phosphorus, 51.504.35 oreign Ores* (C.i.f. Philadelphia or Baltimore, Exclusive of Duty) Per Unit frican, 46-48 Mn66.5c. to 68c. ndian, 48-50 Mn68c. to 70c.	RES Brazilian, 46-48 Mn67c. to 68c. Cuban, 51 Mn81c. Per Short Ton Unit Tungsten, Chinese, Wolframite, duty paid, delivered\$24 to \$26 Tungsten, domestic scheelite, at mine\$24.00 to \$25.00 Chrome ore, lump, c.i.f. Atlantic Seaboard, per gross ton; South African (low grade)\$28.00 Rhodesian, 45Nom. Rhodesian, 48Nom. *Importations no longer readily available. Prices shown are nominal.	and Illinois
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Some ways to conserve Tool Steel

DO'S AND DON'TS OF FORGING

Conserve tool steel. Every pound of it is vital to war production. By following these suggestions on forging, you can lengthen the service-life of your steel . . . speed up production . . . and help beat the Axis.

The process of forging tool steel may be divided into three steps—
(1) heating, (2) forging, and (3) cooling. Each of these steps is important, and must be carefully controlled to get maximum service from the steel.

Heating

Heat the piece to be forged slowly and uniformly throughout. Many tool steels conduct heat slowly, and for this reason, sufficient time should be allowed for heat to penetrate to the center of the piece. It is very important that the piece be heated to the proper temperature before forging.

Preheat the steel in a preheating furnace before bringing it up to forging temperature. This largely eliminates too-rapid preheating and the danger of rupture. It also decreases the time necessary to hold the piece at the higher temperature in the forging furnace. Excessive scaling is prevented. Grain-growth and decarburization are reduced.

If a preheating furnace is not available, warm the steel before putting it into the forging furnace. This can be done by placing the steel on top of the furnace, or on the shelf in front of the charging door so that

the chill is removed. The same warming can be carried out if a blacksmith's fire is used.

Forging

Generally speaking, about fifteen minutes of soaking at forging temperature for each inch of greatest thickness is sufficient for carbon steel. This time should be increased to about half an hour for tungsten and high-chromium steels. Experience, together with the equipment available, is the best guide.

Forge with a hammer of sufficient capacity to thoroughly work the steel, but not so heavy as to cause ruptures. All reduction in cross-section should be carried out by going from a square section to a square section. The corners should be knocked down on each reduction. If a round or hexagonal section is desired, the piece should not be brought to the desired shape until the final hot-work operations. When

forging rounds, use V-type dies in working down the section from a square. In high-carbon, high-alloy tool steels, this practice prevents center ruptures.

Do not forge at too low a temperature, as cracking will result.

Cooling

Most tool steels will harden in air to a certain extent, and should therefore be cooled slowly and protected from moisture or drafts. To prevent cooling strains, forged parts should be cooled by burying in either dry ashes, lime, or silocel.

If forgings are of intricate shape, such as gooseneck planer tools, spring tools and the like, they should be annealed after forging to remove the stresses set up by forging and cooling. If a previously hardened tool is salvaged by reforging to make a smaller tool, it should be annealed before reforging.

This information is available in the form of a card suitable for hanging in shop or office. No cost or obligation. Write to Bethlehem Steel Company, Bethlehem, Pa.



BETHLEHEM STEEL COMPANY

THE IRON AGE, June 25, 1942-3

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Our experts are ready to take up your problems, study conditions, and work out with you the solution of these problems in connection with our machines through the knowledge we have gained from large experience in the use of grinding machines.

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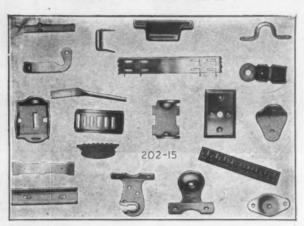
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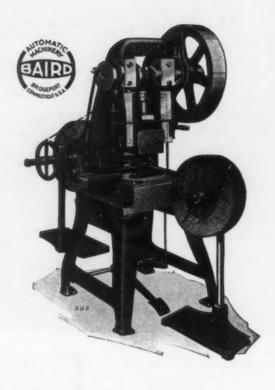
BAIRD AUTOMATIC PRESSES . . .

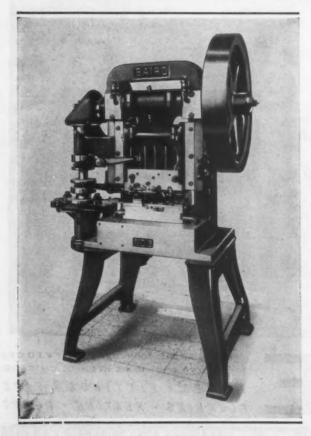
Herewith are shown two types of Baird Automatic Presses for large quantity production. The one to the right is a Standard Heavy Single Action Open Back Press with readily removable and readily attachable automatic attachments, in this instance a single station transfer.

Many manufacturers using automatic machines elsewhere in the shop are overlooking the benefits of the automatic principle in their press departments. For constructive suggestions leading toward betterment of press production we invite such manufacturers to

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MAKE IT A REGULAR PART OF YOUR TRAINING PROGRAM

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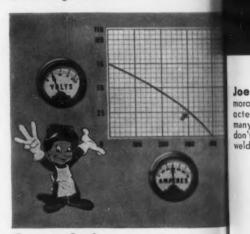
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AUTHENTIC IN EVERY DETAIL!

"The Inside of Arc Welding" was produced by the Raphael G. Wolff Studios of Hollywood, working under the technical supervision of the General Electric Welding Laboratories and with the co-operation of Government and industry representatives. All terms, positions of welds, and electrode specification numbers used in the film refer to A.W.S. Standards.

Full-color Photographs made by a new technique show the arc and molten pool in action—demonstrate the causes of bad welds, as shown above, as well as good ones.



Current Setting—the proper relation between arc voltage and amperage—is clearly and effectively diagrammed with animated charts and drawings.



Correct Procedure for welding in the vertical, horizontal, flat, and overhead positions is illustrated by actual demonstrations by skilled operators.

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—the basic principles of shielded metal arc welding, the four factors that determine the quality of the finished weld: length of arc, angle of electrode, current setting, and speed of travel.

2 Flat position

—detailed demonstrations of how to minimize arc-blow and make good welds in the flat position—full color photographs showing what happens inside the molten pool.

3 Horizontal position

—proper procedure for making good welds in the horizontal position—how to manipulate the electrode to provide properly shaped beads and good fusion. —how to take advantage of the absence of arc-blow with a-c—the use of larger electrodes and higher current, with resulting higher deposition rate.

4 Alternating-current—flat-horiz.

5 Vertical position

—do's and don'ts for welding in the vertical position — how to control the molten metal and overcome arc-blow as well as other factors to be considered when welding in this position.

6 Overhead position

—a clear, concise explanation of the principles that govern arc welding in the overhead position—with particular attention given to control of the four fundamental factors.

*You are sure to want Part 1 (FUNDAMENTALS) and one or all of the others, depending upon your particular training program.

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Joe Ma Gee, a humorous cartoon character, emphasizes many of the do's and don'ts of good arcwelding practice.

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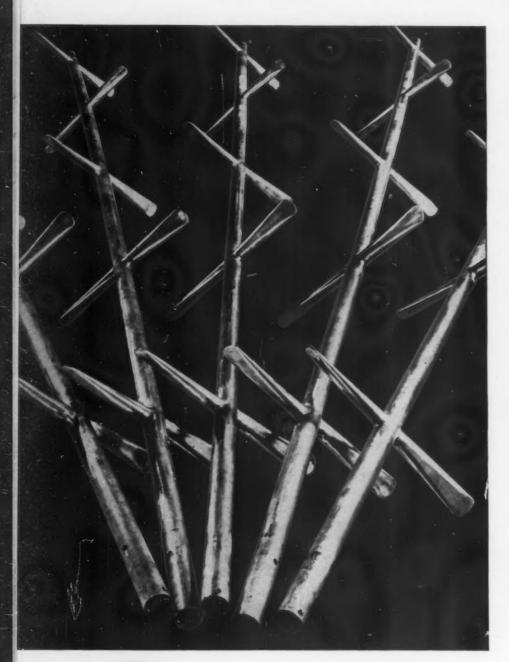
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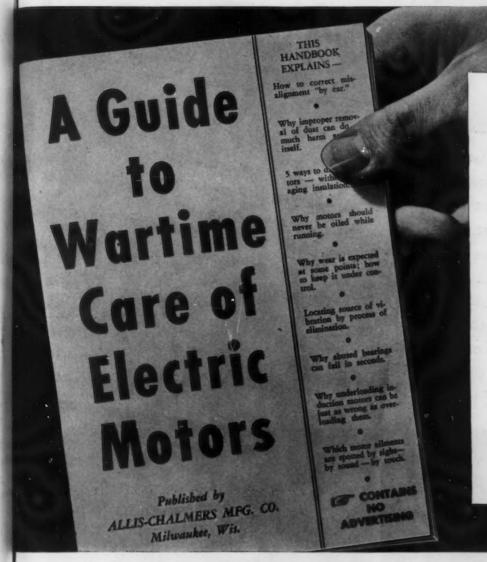
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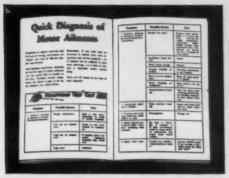
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AT PRESENTATION ceremonies in National Acme plant, F. H. Chapin, President (center) and M. Bizovsky, local MESA president (left), accepted the award on behalf of their fellow workers. To James Forrestal, Under-Secretary U.S. Navy, and Col. S. E. Reimel, Army-Navy Munitions Board, they pledged continued full support of Nation's war effort.



WORKERS CHEERED compliments on their achievement by Cleveland's Mayor F. J. Lausche (speaking) and by highranking Army and Navy officers. They went back to their jobs with renewed determination to beat their phenomenal machine and tool production record, which has already increased over 600%.

uinspiration to even greater effort



PROUDLY now the Army-Navy Star burgee flies over NAMCO plant; proudly, too, every man will wear a lapel button denoting his part in the primary job of getting munitions and equipment to the men at the fighting fronts.

"MORE Output Per Day and More Bonds Per Pay" is the slogan at The National Acme Co. Subscriptions via pay roll deductions alone now exceed \$10,000 per week. Photo shows Harry Mack, father of a U.S. Navy volunteer, buying another war bond.



AXIS-BUSTING munitions parts shown below are but a few of many now being made on Acme-Gridley Bar Automatics to exacting U. S. Army and Navy specifications. 42 years of successful experience stand behind today's amazing speed, accuracy and low operating cost of these machines.

SPEED—ever greater speed—but at no sacrifice of accuracy—is today's vital war production demand. And Acme-Gridley Automatics are helping to meet the Nation's need by sustaining accuracy at fastest feeds and highest spindle speeds that modern cutting tools can safely stand.





THE NATIONAL ACME CO.

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS - SINGLE SPINDLE AUTOMATICS - AUTOMATIC THREADING DIES AND TAPS - SCREW MACHINE PRODUCTS - THE CHRONOLOG - LIMIT SWITCHES - SOLENDIDS - POSITIVE CENTRIFUGE - CONTRACT MANUFACTURING



a guarantee of customer satisfaction

When changing production needs make extra demands for quality, tin plate users turn to WEIRITE. For WEIRITE Tin Plate and allied steels reflect dependable quality in uniformity of gage, ductility and coating . . . dependable quality that anticipates new demands . . . and gives a guarantee of customer satisfaction which has maintained Weirton as the world's largest independent producer of tin plate.

LIST OF PRODUCTS

Bars... Angles... Structurals... Piling... Hot and Cold Rolled Strip... Hot and Cold Rolled Sheets... Galvanized Sheets... Long Terne Sheets... WEIRITE Cold Reduced Tin Plate... Terne Plate—Special Coated and Roofing Ternes... Tin Mill Black Plate... Lacqured Tin Plate and Black Plate.

WEIRTON STEEL COMPANY—WEIRTON, WEST VIRGINIA

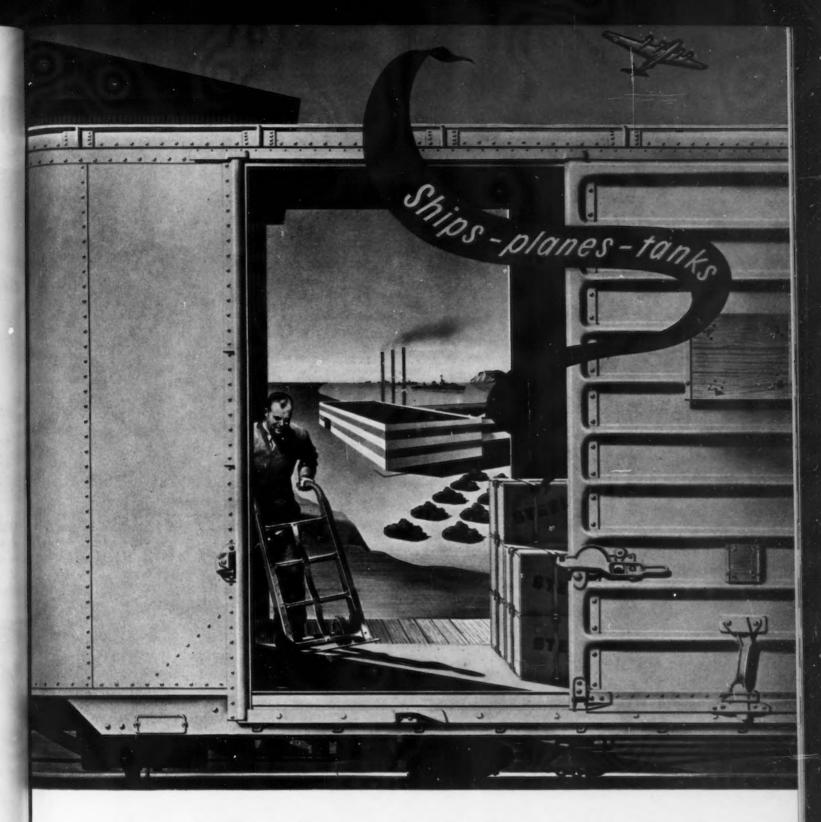
Sales Offices in Principal Cities

division of



NATIONAL STEEL CORPORATION

Executive Offices, Pittsburgh, Pa.



Even before they're made they must travel

American planes could never hope to dominate the skies . . . American tanks could never crash their way to victory . . . American ships could never hope to succor a desperate world . . . if American transportation had not first done the biggest job of its kind in history.

At a time when everything depends upon a free flow of traffic, the American transportation system has worked so magnificently that America, like a man with a good stomach, has scarcely been aware of its existence.

Even before ships, planes, tanks and guns are made, the railroads and other means of transportation must carry the raw materials thousands of miles from a thousand suppliers to a thousand different parts of the nation.

Koppers has been able to furnish supplies of basic materials needed by the transportation industries . . . from Koppers coal mines, from Koppers plants where ties and other wood products are pressure-treated to give them long life, from Koppers creosote refineries, from

Koppers roofing and waterproofing plants, and paint factories . . . from plants which make packing for steam locomotives and piston rings for Diesels.

Maybe, some day in the future, these products may serve your peacetime operations as they are now serving wartime safety. Koopers Co., Pittsburgh, Pa.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY)



First, the change-over to war production. Then, a mounting determination to turn out more and more and still more material. In these procedures the cold sawing of metal holds an increasingly important place. Motch & Merryweather Cold Sawing Machines can greatly simplify your plant conversion and then lift your production rate because of five proven qualities:

Accuracy. The M&M Cold Saw delivers consistently square sections without chatter or burr, without variation, and without scrap.

Speed. You get steady cutting speeds up to 1-1/2 times the highest rate ever attained before. "Amazing!" technicians declare.

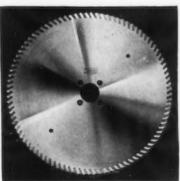
Flexibility. Available is a range of attachments for the single or multiple cutting of practically any metal, ferrous or non-ferrous.

Capacity. Two sizes, the No. 3 and No. 4, handle round stock up to $16^{\prime\prime}$ and squares up to $14\text{-}1/2^{\prime\prime}$.

Stamina. You can run the M & M Cold Sawing Machine to capacity 168 hours a week and keep it up indefinitely. Ask for our bulletin.

THE MOTCH & MERRYWEATHER MACHINERY COMPANY Penton Building . . . Cleveland, Ohio

Motch & Merryweather Cold Sawing Machines have speeded the cutting of billets for gun barrels, of shell slugs and other items of war production.



Motch & Merryweather Saw Blades fit any standard machine. They excel in design, fit, work manship, cutting speed and endurance. Sizes, 26",28",30",38",42",44".

Built by MOTCH & MERRYWEATHER

MOTCH AND
THE MERRYWEATHER
CALEVELAND
CLEVELAND
PITTSBURGH

FOR UNIFORMLY SOUND WELDS



FOR THE JOB

FLEXARC FP

Use FP with either a-c or d-c for fillet position and general-purpose high-speed welding on low and medium carbon steels.

Use this "hot" high-speed rod on a-c or d-c for downhand position on heavy horizontal fillets and finished beads.

Use SW for thin sheet metal welding. A general-purpose all position electrode for a-c or d-c current.

CASTINGWELD AND FREEMACHINEWELD

For welding iron castings. Latter type made especially for welds to be machined.

Four grades to meet all requirements of hard-surfacing parts of machinery.

NICKELCHROM

NICKELMANG

For welding Stainless Steels For manganese Steel Welding

You'll find it easy to control the metal flow of Westinghouse Flexarc AP Electrodes when making any kind of joint in overhead, vertical, or flat positions on low or medium carbon steels. The performance characteristics of AP rods are balanced with physical properties to speed production of butt, tee, corner or lap joints, and to meet rigid code requirements.

From every position and on every pass, AP fuses solidly, evenly with the parent metal. The special coating protects deposited metal by forming a gaseous arc shield and a light, easily removed slag. Spatter loss is low. Slag volume is at a minimum so that it will not interfere with the welding operation. Beads are flat and smooth.

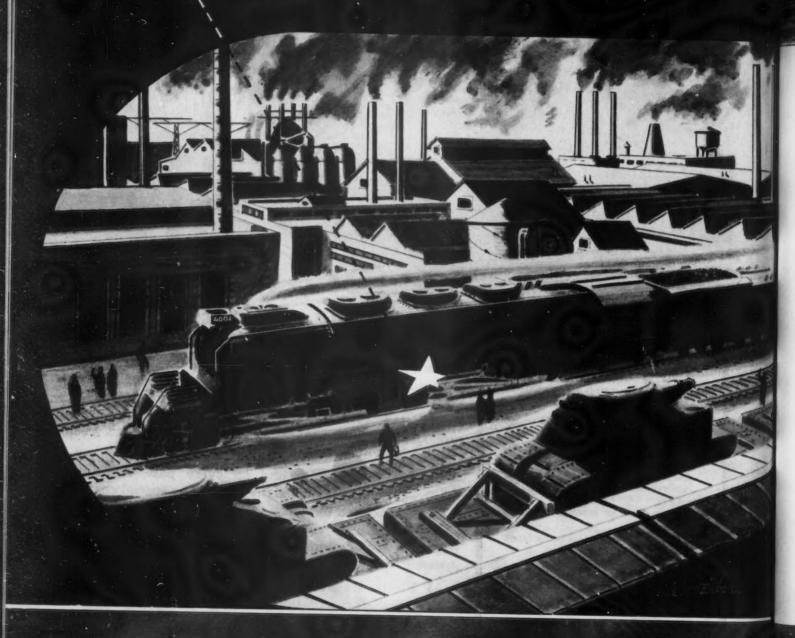
AP Electrodes are available in diameters ranging from 3/32" to 5/16". Try AP yourself and be convinced of its performance. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.



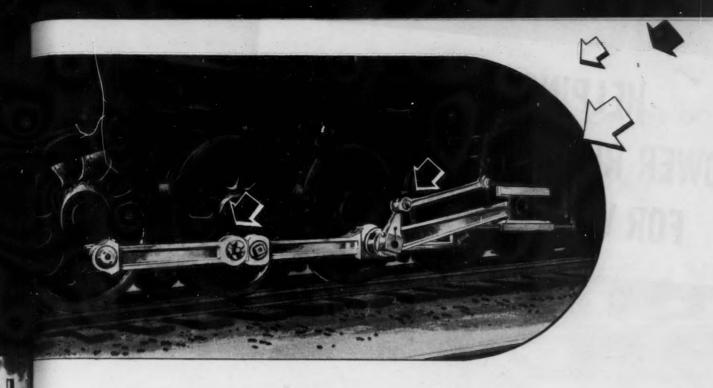
THE IRON AGE, June 25, 1942-17

PROVEN MATERIALS

for one of the toughest stress jobs in the arsenal of democracy...



CORPORATION OF AMERICA - NEW YORK, N. Y.





One of the most vital factors in maintaining the terrific pace of the American war effort is the modern high-speed locomotive—hauling the raw materials, the finished products and the manpower for the greatest military effort the world has ever seen.

It would be hard to exaggerate the engineering achievement represented by these locomotives. Each one is a maze of specialized designs and carefully selected materials to deal with high pressures and temperatures, extremes of driving power, bearing pressure, stress and friction.

Yet of all these problems, one of the toughest involves the main drive and side rods and other reciprocating parts. At high speed, these parts are spun around and back and forth on off-center crank-pins on the sides of the drive wheels—thousands of pounds of steel vibrating at speeds that blur before the eye.

These reciprocating parts must therefore have great strength and toughness. But they must also be as light as possible. At high speed, enormous centrifugal and longitudinal forces are created by the motions of these parts—forces which are multiples of the weight of the parts involved and which limit the top speeds of safe operation.

These parts therefore present a challenging problem in design—to provide adequate bearing surfaces and yet keep cross section at a minimum. Then there is the problem of finding materials which can stand the stress, impacts and friction of these streamlined designs.

Being heavy sections where uniformity of structure is highly important, it is inherently desirable to avoid quenching. As the parts must be machined with consummate skill and care, fine machining qualities are essential.

To meet these difficult specifications, hundreds of these high speed giants have been equipped with manganese vanadium steel main and side rods and other reciprocating parts—

Because manganese vanadium affords an exceptional combination of high yield point, high ductility, high fatigue value and unusual resistance to impact down to temperatures well below 0°F.;

Because manganese vanadium develops the required properties with simple normalizing (cooling in air) without liquid quenching;

Because, of all steels, manganese vanadium is one of the most practical, reliable and simple to handle for these applications . . . a steel that can be properly and safely handled in every phase of fabrication and heattreatment with the facilities in most railroad shops.

FERRO-ALLOY5

HELPING TO PUT POWER RESOURCES TO WORK FOR WAR PRODUCTION

AMERICA is fortunate to have entered this war with so many key power projects complete or nearcomplete. Throughout the nation, as gigantic new war plants have sprung from open fields, production has been sparked into swift activity by a ready source of electrical energy. Whatever the source of power-whether steam or hydraulic-the important thing is it's ready to help industry equip and maintain a victorious fighting force.

Fabricated steel structures built by American Bridge are helping to put power resources to work for war production.

Hundreds of steel gates of all types -tainter, rolling, lift and swing-are impounding the waters of many rivers. They harness the flow to control floods, extend navigation to upper reaches, and generate electrical energy.

Thousands of steel towers dot the

continent, carrying power lines that radiate from sources of energy to industrial communities and to essential war industries that have mushroomed throughout all sections of the nation. These transmission towers were designed to carry heavy-duty power lines under extreme climatic conditions and to traverse every imaginable type of terrain - deserts, valleys, plains and mountains. Their efficiency has been

tested by subjecting full-size "pilot" towers to duplicated field loading conditions in our Test Frame, the largest in the country.

Just as many of the projects we have completed in recent years are serving the war effort in various ways, now all of our resources of equipment, engineering talent, and specialized "know how" are active in projects directly essential to war.

AMERICAN COMPANY

General Offices: Frick Building, Pittsburgh, Pa.



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NITED STATES STEEL



The Rolls with the Red Wabblers

They Roll More Tons Per Grind

The NEW Abramsen Straightener

Cinder Pots and Supports

Heavy Duty Engine Lathes

Improved Johnston Patented Corrugated

"Techni"

Since 1803-Pioneers, Engineers and Builders

MACKINTOSH-HEMPHILL COMPANY

PROCESS BACK UP ROLLS

under pressure. The journals are soft and strong to withstand imposed stresse



greater strength longer wear

freedom from spalling and internal defects

if MAN-HOURS

turn to "Moman Hours"

Leaching women the war-time jobs of relieving men at machine tools may come sooner than we think.

When it does, we can be grateful to our engineers and designers

for the constant improvements which have led to simpler, easier operation, and have lessened the demands for physical strength.



1215 East Washington Avenue

Madison, Wisconsin

LOOK AHEAD . . . KEEP AHEAD . . . WITH GISHOLT IMPROVEMENTS IN METAL TURNING

TURRET LATHES . AUTOMATIC LATHES . BALANCING MACHINES

Have you tried Scully?

WE are not magicians, but we will do everything within our power to help everything within our power to help you get the materials you need. We have stocks of many steels on hand, also tools, machinery and other equipment.

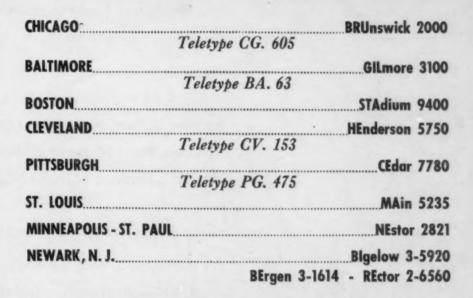
Be sure to try Scully - see our phone numbers below. Cut out the number of the warehouse nearest you and paste it in a handy spot.



Structural material Plates, various qualities Floor Plates Sheets: Hot Rolled, Cold Rolled, Galvanized, etc.
Bars (all shapes): Hot Rolled
Carbon and Alloy grades Hot Rolled Strip Steel Spring Steel · Tool Steel Cold Finished Bars, Carbon and Alloy grades Wire COR-TEN and MAN-TEN Shapes, Sheets and Plates Abrasion-Resisting Sheets and Plates Eaves Trough, Conductor Pipe U·S·S Stainless Steel and Stainless products **Expanded Metal** Boiler Tubes Rivets, Bolts, Nuts, Washers Dardelet Rivet and Machine Bolts Welders and Welding Accessories Chain Clamps Flanges Expanders, etc. Hoists, Shears, Rolls, Punches,

Cut-Off Machines, Saws,

Nibblers, etc.



IN STOCK! DARDELET "RIVET-BOLTS"



We can offer immediate shipment of both Dardelet "RIVET-BOLTS" and Dardelet Machine Bolts. These bolts save valuable time and labor and assure permanently tight joints.

The Dardelet "RIVET-BOLT" is a ribbed bolt with Dardelet self-locking thread, and is widely used for field erection of structural steel. Has recessed nut. Bolt is driven in and nut is applied with wrench. Economical and strong.

The Machine Bolt with Dardelet self-locking thread is for deneral use where vibration is present.

is for general use where vibration is present.



PRODUCTS COMPANY

Distributors of Steel and Steel Products

Warehouses at CHICAGO . NEWARK, N. J. ST. PAUL - MINNEAPOLIS . CLEVELAND ST. PAUL - MINNEAPOLIS

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STATES STEEL

We serve You by serving Mational Defense

Twenty-four hours a day, seven days a week, we're making drop, upset and steam hammer forgings for building the enormous offensive and defensive machine needed to assure victory for our nation. One day is like another in our haste to meet the demands of all-out war.

Naturally, some of our friends who are makers of consumer goods cannot be served. Too, the needs of prospective customers cannot be filled—not, however, because of lack of desire on our part; but rather because the needs of the emergency must be met first.

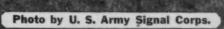
We serve you now by serving national defense! When our job of war is done, we'll welcome the opportunity of solving your forgings problems!

KROPP FORGE COMPANY

World's Largest lob Forging Shop 5301 West Roosevelt Road, Chicago, Illineis Representatives in Principal Cities

The United States Bureau of Ordnance Play and Navy "E" Pennant for Excellence, rarely awarded material suppliers, fly high at our plant. We are proud of this recognition of our efforts.

Courtesy Vultee Aircraft, Inc.





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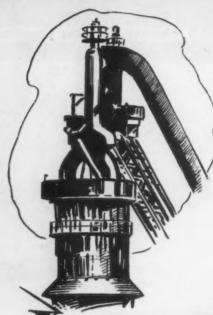


KRAPP

Photo courtesy Curtiss-Wright Corp.

Official U. S. Navy Photograph

CONDITIONED BLAST



H₂O+C → H₂+CO

Requires Heat

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Blast Maintains This

Reaction Constant

Reaction

RESULTS:
INCREASED CAPACITY
MORE UNIFORM PRODUCT

DESIGN FEATURES:

Greater Economy...Fewer Critical War Materials Required

For Full Details and Complete Design and Construction Service, write-



J.F.PRITCHARD & CO.

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BRANCH OFFICES IN TULSA, OKLA. HOUSTON, TEXAS ATLANTA, GA. CHICAGO, ILL. PITTSBURGH, PA. NEW YORK CITY

MINE MAINTENANCE



with a Super Service Radial

Today in many large plants the Maintenance Shop is one of the most important and vital departments. Nothing less than the most dependable, most versatile tools can be tolerated in such shops.

The above photograph shows one of the three Super Service Radial Drills in the UNDERGROUND MAINTENANCE SHOP

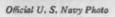
of a large mine where they are relied upon for a variety of metal drilling operations.

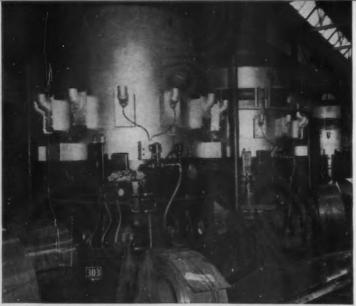
These machines have a wide range of speeds and feeds, long-lived accuracy and features for fast, easy operation. The distinctive features of the Super Service Radial Drills are explained in Bulletin R-24. Write for it today.

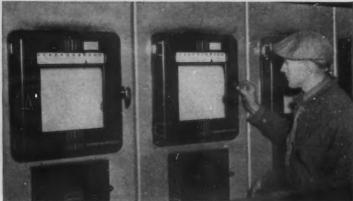
THE CINCINNATI BICKFORD TOOL CO.

DAKLEY . CINCINNATI . OHIO . U.S.A.









The handling of Industry's big furnaces, like the handling of big guns, is a job for trained men with fine instruments. Here are Micromax pyrometers, regulating the temperature of an Ohio steel mill's cover furnaces.

standard terminals, a furnace any place in the shop can then be "plugged in" to a Micromax Controller. to

The controller may turn fuel up and down rather abruptly (on-and-off control) or it may throttle it gently (proportional-position-plus-floating control). The method used depends on the type of furnace, the load, the job to be done, and so on. It may go from one method of control to the other, and base its work on a thermocouple in the load, or on one outside. It may regulate rate of hearing and cooling as well as soak temperature.

But, whatever its instructions, Micromar carries them out in its own fully-automatic way. Naturally, in a big steel mill, the operators don't just walk away and leave an acre of furnaces entirely to the automatic controls, but, as far as Micromax (Model § shown) is concerned, even this could be done for some days at a time.

For Micromax needs no daily attention It standardizes itself, thus preserving its own accuracy. In 24-hour service, it needs in every 2 weeks or so; chart perhaps once a month; oiling, cleaning and dry cells only at long intervals. Even if an operator want to "baby" the pyrometer, there's very little he can do. The machine attends, micro responsively, to its job of regulating tempera ture; records the results as it goes along helps turn out steel which is perfectly an nealed for America's growing war machine.

Micromax Controllers are available in 5 models, and most applications are, of course, far simpler than the one described above. Our engineers will be glad to help you select and apply the one to regulate any furnace in which you may interested.

MICROMAX TURNS ON THE HEAT FOR MORE WAR-TIME STEEL

Annealing steel strip for use in guns, ships, tanks, etc., is the job of the battery of Micromax-controlled cover furnaces shown above. The furnaces are Wilson radiant-tube units, having a capacity of several tons each. Temperature is controlled by Micromax Thermocouple Pyrometers directing the action of fuel-valve drives. The instruments themselves are standard, but the details of their installation present some features of value for other instrument users.

The Pyrometers are in a Control Room, back against the building wall. They are out of the way of cranes, trucks and unauthorized fingers, and are also well away from the cover furnaces, which, of course, are moved about in the big annealing shop.

Furnaces have some couples embedded in the load; others near the tubes. Valve-drives are permanently mounted on the furnaces; one can be seen in the foreground.

The method for connecting furnaces to Micromax Controllers is to have long leadwires from both couples and valve-drives, and from the instruments. By means of



A G-E Catenary-type electric furnace, for normalizing steel strip, is controlled by this battery of Micromax Pyrometers in an Ohio steel mill. Heating chamber is 31 ft; cooling is 60 ft; power rating is 460 kw, 220 volts, 3 phase. A typical example of how Micromax is selected for the vital, big jobs of temperature control throughout the metal industries.

Jrl Ad ENT-0600C(48)



LEEDS & NORTHRUP COMPANY, 4956 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS . TELEMETERS . AUTOMATIC CONTROLS . HEAT-TREATING FURNACES

... centralized control of cutting tools will save materials and time

Information supplied by "The Iron Age"

The unnecessarily high casualty rate of single point cutting tools is a phase of the battle of production which deserves more attention than it seems to be getting.

down

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along
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achin
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above
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160 kw.

PA

ACES

One remedy that offers great possibilities is the establishment of a system of centralized tool control.

Such a system would have the obvious advantage of coordinating three most important factors—design, operation and maintenance of cutting tools.

To be effective, design should be based on a knowledge of actual operating requirements, including material being cut and the machine on which the tool is to be used.

Speeds and feeds should be selected from the point of view of economical tool life instead of rate setting. Then operators should be prevented from running tools to destruction, thereby eliminating the necessity for trying to salvage tools that are worn beyond all semblance of their original form.

All worn tools should be redressed in the tool crib by machine according to the drawing. Operators should not be allowed to redress tools by hand to the angles they assume the tool originally had.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED, OR CANNED . FERROMOLYBDENUM . "CALCIUM MOLYBDATE"

Climar Mo-lyb-denum Company 500 Fill b Avenue · New York City



This Simple Idea...
is SAVING BELTS

for Industry...and Rubber for the Nation

To see for yourself the belt-saving importance of the CONCAVE SIDE, just pick up any V-belt and bend it as it bends when it goes around a pulley.

As the belt bends, grip its sidewalls firmly with your fingers as in the photograph above. You will feel the sides of the belt change shape. If the sides were straight before bending, they will bulge outward as the belt bends. (See Figure 1 on the right).

Now look at Figure 2. Here you see how bending changes the shape of a belt that is built with the patented Concave Side. The side becomes perfectly straight. This belt, when bent, precisely fits its sheave groove. Here are the savings:—(1) There is no side-bulge. This means uniform wear—longer life—a saving in belts for you, a saving in rubber for the Nation. (2) The full side-width of the belt uniformly grips the sheave groove wall—carries heavier loads without slippage—another saving of belts and a saving in power, too!

Only belts built by Gates are built with the Concave Side, a Gates patent.

What Happens When a V-Belt Bends

GATES PATENT

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO DRIVES

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138-THE IRON AGE, June 25, 1942



UNSUNG HERO!

For years he's been making a living out of what you so smugly call "junk." Gathered up what you threw away... paid money for it, even. Recognized the importance of it, located it, invested in it, hauled it, sorted it, prepared it, stored it. Thank God he did.

Today the SCRAP collector is almost the No. 1 man on the blitz parade. Pin a medal on him, if you want to reward public service!

He just about doubles steel production!

For, every ton of scrap he feeds to the hungry

maw of the steel furnace, combined with smelted iron, yields approximately twice the amount of new, better steel. For twice as many ships, tanks, guns, planes, shells and other weapons of Victory! Or in peace days, double the abundance of automobiles, refrigerators, washing

machines, radios and other contributions of industry to the comfort and progress of a free America.

Scrap collectors and dealers, the country over, are cooperating with Salvage for Victory campaigns ... willingly paying individuals or patriotic organizations for scrap thus obtained. But every day . . . in between civilian drives . . . they continue the search for scrap in their own established, systematic way!

You can help them to get in the scrap!



Pittsburgh Steel Co. 17

GRANT BUILDING

PITTSBURGH. PA.

Any type of assembly will move faster... with PARKER-KALON

Quality-Controlled

SELF-TAPPING SCREWS



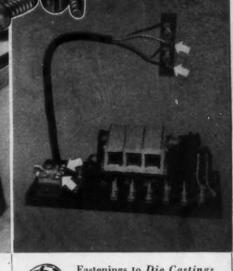


Fastenings to Steel I Beams (1/4" to 1/2" thick) are made with P-K Hex Head Self-tapping Screws at a saving of 75% in time.





Aluminum Castings and plastics are quickly assembled with P-K Type Z Self-tapping Screws. No tapping in aluminum...no inserts in plastics.



PKER-KALON

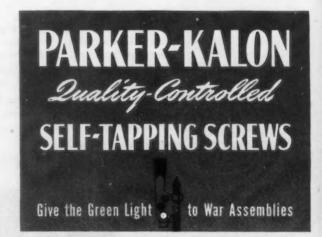


Fastenings to Die Castings, Fibre-Bakelite, Ebony Asbestos are simplified with P-K Phillips Recessed Type Z Self-tapping Screws.

There's a type of P-K Self-tapping Screw for every type of metal and plastic assembly. No matter what materials you're working with, you'll get stronger, speedier fastenings. You'll save time by eliminating tapping, and you'll save the cost of maintaining taps and tapping equipment.

The change-over to Self-tapping Screws calls for no special skill or special tools – involves no costly tool-ups. You can start them on your assemblies immediately.

But be sure to specify Parker-Kalon Self-tapping Screws so that your assembly line won't be slowed up by "doubtful screws" – screws that *look* all right, but some of which fail to work right. The Parker-Kalon Laboratory, without counterpart in the screw-making industry, guards the quality of every P-K Screw produced. This extra dependability has saved countless hours for war-busy plants. Parker-Kalon Corporation, 200-202 Varick Street, New York, N. Y.



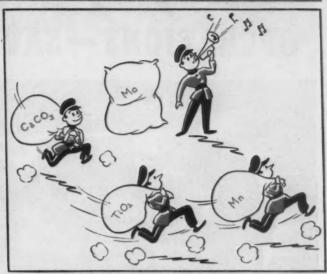


SELF-TAPPING SCREWS FOR EVERY METAL AND PLASTIC ASSEMBLY . . . AND OTHER FASTENING DEVICES

A WELD-E-MENTARY TALE



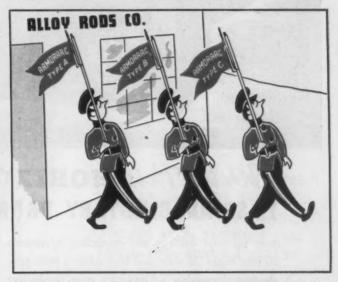
The four heroes of this tale are the elements Titanium, Manganese, Lime, Molybdenum. When they're relaxed and idle, they look like this. But, now is no time to be relaxed and idle. They have a big job to do . . . and they're ready to do it.



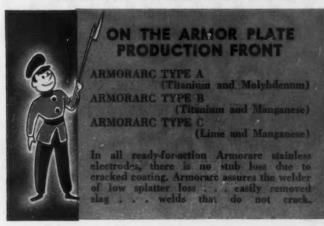
Ta-ra-ta-ta! Call to arms...and our heroes are off to their induction center at Alloy Rods Company. Because it's M-Day for the welding industry, and super-Mobilization Day for these guys; really the power behind the spark in armor plate welding.

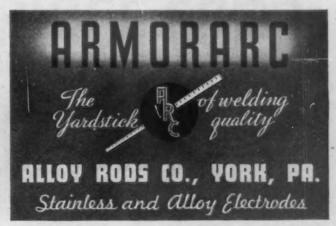


Getting the mixture of their lives. Titanium and Molybdenum get together, form the coating supreme for Armorare Type A. Titanium also mixes with Manganese, comes out as the coating for Armorare Type B. Lime and Manganese make up Armorare Type C's coating. Quite a crowd, this Armorare family . . . eh!

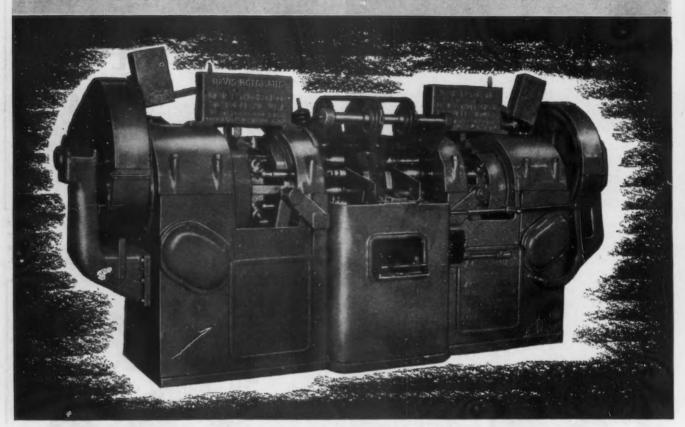


Hep, hep, hep...look out, Adolf! You too, Mister Jap! Our heroes really can brag about the "coats of arms" of the toughest bunch of electrodes for armor plate welding you ever saw. Three cheers for Titanium, Manganese, Lime, Molybdenum—elements which turn into weld-e-ments for Armorarc's coating.





Multipoly DRILLING and THREADING OPERATIONS — SAVE VITAL MAN-POWER



• With This HORIZONTAL ROTOMATIC 12-SPINDLE ROTARY DRUM-TYPE DRILLING MACHINE

Step up your drilling and threading operations to new highs, to meet and beat today's peak production demands . . . multiply your productive capacity on other milling, reaming and boring operations with this 12-Spindle Rotary Drum-Type Drilling Machine.

This machine is completely automatic. Operator simply places part in fixture . . . part is automatically clamped . . . and in one revolution the

completed part, accurately drilled and threaded, is automatically discharged by the self-opening die heads. Spindles are equipped with lead screw to facilitate loading.

Write for information on this machine — which can be furnished for milling, drilling, reaming and boring operations, as well as for threading —and ask about other specialized developments in Davis high production machines.

DAVIS & THOMPSON COMPANY . MILWAUKEE, WISCONSIN, U.S.A.

DAVIS ROTOMATIC

HIGH PRODUCTION MACHINERY

Complete Tubular Service BOSTON BUFFALO CLEVELAND NEW YORK PITTSBURGH PHILADELPHIA CINCINNATI INDIANAPOLIS ST. LOUIS An organization devoted exclusively to the warehousing and sale of CARBON STEEL and ALLOY tubular products - STRAIGHT, BENT and FABRICATED. **BOILER TUBES — PRESSURE TUBES** MECHANICAL STEEL TUBING SEAMLESS STEEL PIPE STAINLESS STEEL TUBING & PIPE PIPE & TUBE BENDS & COILS

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THE IRON AGE, June 25, 1942-143

Don't Wait for a New Machine -USE YOUR QUICKWORK for Circle Cutting



Rotary Shear, whatever its original purpose, you can quickly put it to work cutting out circles in any type of sheet within the range of its capacity. For general work or straight production, your Quick-

work Whiting Shear with circle cutting attachment cuts true circles-clean, without burrs-in one operation at speeds up to 75 ft. per minute.

Save delay-investigate the special attachments that make your Quickwork Shears the most versatile tool in any shop.

**** ARMS MATERIAL** MEETS DEFENSE DEADLINE

For use in army munitions, the details of which cannot be disclosed, 30" diameter circles of 1/4" steel were needed-in a large quantity-and in a great hurry.

By using a Quickwork Rotary Shearanda special arrangement of circle cutting attachments, Quickwork-Whiting engineers and mill executives solved the problem.

Today, a single unit is producing these pieces at the rate of 7 per minute. Only three operators

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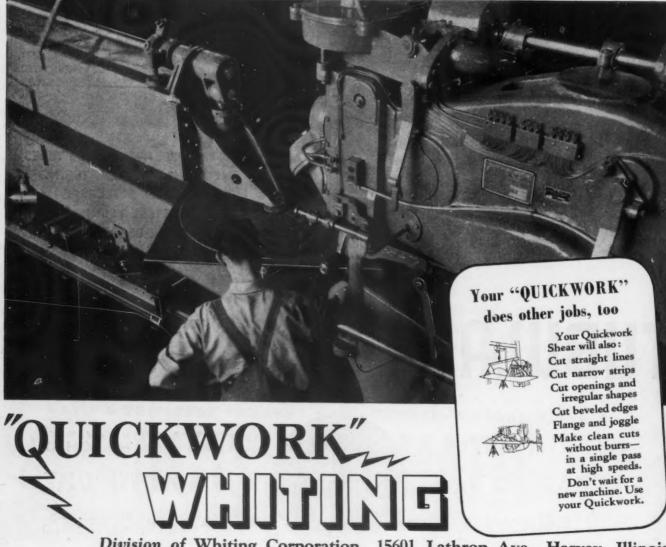
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This is just another example of the versatility and capacity of Quickwork-Whiting Rotary Shears.

Write for your copy of the new Quickwork-Whiting Special Attachments Bulletin.



Division of Whiting Corporation, 15601 Lathrop Ave., Harvey, Illinois

V.S Press Helps Machine Gunners Shoot Straight

At many a "somewhere in the U. S. A.", Watson-Stillman Straightening Presses are putting the finishing touches on machine gun barrels—more quickly, more accurately than ever before.

Meanwhile, scores of other plants are finding new uses for these versatile presses—straightening all kinds of rods, bars, tubes and structurals. For these units are available in many capacities—with and without movable work tables—equipped or not equipped with centers, rollers and other accessories. But, whatever the adaptation, all are conspicuous for their high speed adaptation, extremely sensitive control, and design refinements that only W-S hydraulic engineering experience

and skill can provide.

Maybe this press or other W-S Presses like or unlike it can solve some of your problems. Bulletin 110-A, a condensed catalog, will answer that question. Secure it now.

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REE! Hydraulic Handbook

Jours for the asking. Capacities of Hydraulic Rams; fice Discharge of Water; Seamless Pipe Properties; and Materials; etc., etc. No advertising. Write The otson-Stillman Co., Roselle, N. J.



WATSON-STILLMAN

Engineers and Manufacturers of Hydrounic Ma chinery and Equipment—Hydraulic Presses, Pump and Jacks Forged Steel Values and Fittings



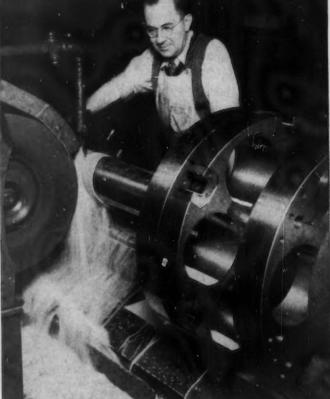
TO PLANT SUPTS.

This is one of a series of ads addressed primarily to new grinder hands. If you would like additional copies without our signature, for your bulletin board, tell us how many you need.

How to get better and longer service from your grinding wheels...

• The war imposes a double task on industry and a patriotic responsibility on grinder hands. Speed of production has to be increased, without waste of basic materials. With grinding playing such an important part in production, these simple rules may help you do your job better!





USE THE RIGHT WHEEL IN THE RIGHT PLACE

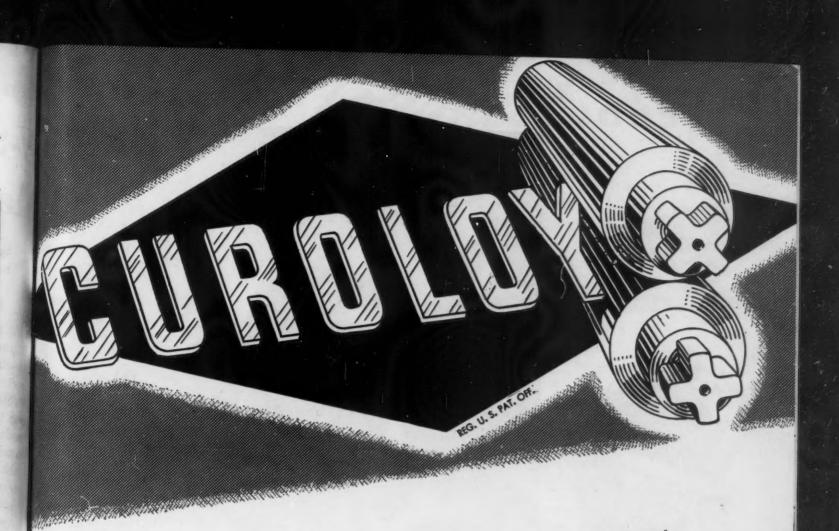
Given data on the type of grinding job, the character of metal to be ground, the amount of stock to be removed and the finish desired, a grinding wheel manufacturer can give you a wheel in the right grit, grade, grain, bond, shape and size to meet definitely your grinding conditions—a wheel that will last longer, do better work at reduced grinding costs. And sales engineering service will help you to select the right wheel for every job.

MAKE SURE YOUR GRINDING SET-UP IS RIGHT ON EVERY JOB

Manufacturer's recommendations should be carefully followed on wheel speed, work speed, proper coolant, wheel traverse, rate of infeed etc. Only the correct balance of these factors gives you the full advantage of properly speci-fied wheels. One of the services performed by grinding wheel sales engineers is to check your grinding conditions on the job and point out the best method of carrying out the grinding operation.

CARBORUNDUM COMPANY . NIAGARA FALLS, N. Y.

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)



Birdsboro patented copper grain roll for Roughing, Semi-Finishing and Finishing of mild, alloy, tool and special steels; noncorrosive irons and steels; non-ferrous metal bars and shapes at

LOW and HIGH TEMPERATURE ROLLING

Available in four grades - Hard, Medium, Mild and Extra Mild to meet your specific requirements. If it's a roll problem, consult Birdsbore

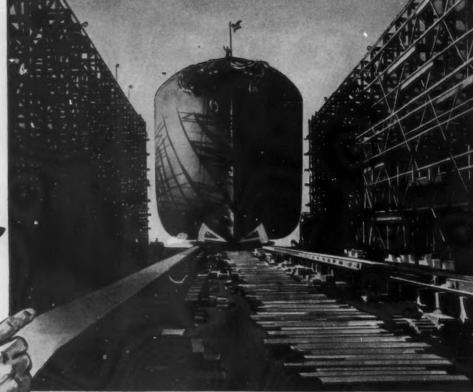
BIRDSBORO STEEL FOUNDRY AND MACHINE CO. . Plants at Birdsboro and Reading, Pa.

HIRDSBORD ROLLE



 Awarded the Navy "E" for excellence in war production, P&H displays it also as a pledge of future effort.





There Goes Another 35 Miles of Welding!

THINK OF IT! — an average of 35 linear miles of welding to complete the hulls of the new cargo vessels that are coming off the ways so rapidly! Such tremendous footage indicates the need for the machine which makes welding easier, faster — and assures more uniform results.

To speed production is one reason why P&H-Hansen Square Frame Welders are being more generally used in ship-building and other important industries. Another is to gain these important advantages:

- Single current control with automatic arc response for all classes of work.
- Square frame design which permits machines to be operated singly, or in parallel to meet all amperage requirements.

Where priorities allow, very prompt deliveries are available. For complete information on P&H-Hansen Square Frame Welders, write for Bulletin W-26.

Gen. Offices: 4401 W. National Ave., Milwaukee, Wisconsin



Dual mounted units provide two services of from 30 to 260 amps. each. Or one service over 400 amps.





• Whatever your problem in welding alloys, P&H can help you. The complete P&H line includes electrodes for welding all analyses of stainless steels, special electrodes for hard surfacing, resistance to impact and resistance to abrasion as well as for welding various types of armor plate, etc.

Write for literature.



1892 1942



Kling High Speed Heavy Duty Friction Saws are the ideal machines for steel mills, shipyards, car shops and steel fabricators. Varying sizes of structural shapes can be cut in rapid succession without need for adjustment. No holding fixtures or clamping device is required. They save time. Blades are readily redressed by hobbing. Mitres can be cut by use of a quick acting clamp. Made in nine sizes: Nos. 0, 1, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, $4\frac{1}{2}$ and 5. Quick deliveries on Defense Orders. Wire or write for bulletins and details.

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Makers of Heavy Duty Plate Rolls, Punches, Combinations (Punches, Shears and Copers), Friction Saws and Shears.

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MACHINERY FOR BOLTS, SCREWS, RIVETS, NUTS, RODS, SPOKES, ETC.
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Here you find a weekly listing of hundreds of products with the names and addresses of manufacturers. The advertisements of these companies appear in The Iron Age.

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Mid-West Abrasive Co., Detroit, Mich.

Abrosives—Polishing
Bay State Abrasive Products Co., Westboro, Mass.

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Carborundum Co., The, Niagara Falls,
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General Abrasive Co., Inc., Niagara
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Norton Co., Worcester, Mass.
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Pennsylvania Salt Mfg. Co., Philadelphis, Pa.

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Alloys—See Ferroalloys

Alloys—Aluminum, Brass & Bronze

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American Brass Co.
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Alloys—Corrosion & Abrasion Resistant

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Brass Co., The, Waterbury,
Conn.

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Republic Steel Corp., Cleveland, Ohio.
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Timken Roller Bearing Co., The, Canton, O.

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Bearings—Roller Tapered
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Pa.

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Alrose Chemical Co., Cranston, Providence, R, I.
Mitchell-Bradford Chemical Co., The,

Mitchell-Bradford Chemical Co., The, Bridgeport, Conn.
Biost Cleaning Equipment
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawka, Ind.
Hydro-Blast Corp., The, Chicago, III.
Pangborn Corporation, Hagerstown, Md.
Ruemelin Mfg. Co., 3870 N. Palmer
St., Milwaukee, Wis.
Blost Furnace Plants—Complete
McKee, Arthur G., & Co., Cleveland.
Blost Furnace Specialties
Balley, Wm. M., Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland.
Blost Gates
Rockwell, W. S., Co., 50 Church St.,
N. Y. C.
Roots-Connersville Blower Corp., Connersville, Indiana.

nnersville Blower Corp., Con-le, Indiana.

nersville, Housen.

Blocks—Chain
Ford Chain Block Div. American
Chain & Cable Co., Inc., Philadelphila. Pa.

Blocks—Set-Up, for Machine Tools
Standard Shop Equipment Co., Inc.,
Philadelphia, Pa.

owpipes—Soldering, Heating
Weldit Acetylene Co., Detroit, Mich.

Blue Printing & White Print Machines & Paper
Ozalid Products Div. General Antilme & Film Corp., Johnson City, New York. Pease, C. F., Company, The, 2695 W. Irving Pk. Road, Chicago, Ill.

Bolt & Rivet Clippers Helwig Mfg. Co., St. Paul, Minn.

American Serew Co., Providence, R. I.
Bethilehem (Pa.) Steel Company.
Clark Bros. Bolt Co., Mildale. Conn.
Cleveland (Ohio) Cap Serew Co., The.
Harper, H. M., Co., The, 2607 Fletcher
St., Chicago, III.
Lamson: & Sessions Co., The Cleveland.
Republic Steel Corp., Cleveland. Ohio.
Rhode Island Tool Co., Providence,
H. I.
Russell. Buydest & **Bolts and Nuts**

R. I. Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y. Triplex Screw Co., The, Cleveland, Ohio.

Bolts—Machine Tool Table
Standard Shop Equipment Co., Inc.,
Philadelphia, Pa.

Philadelpnia, ra.

*ts—Special

Bethlehem (Pa.) Steel Co.

Cleveland (Ohio) Cap Screw Co., The.

Lamson & Sessions Co., The, Cleveland,

Republic Steel Corp., Cleveland, Ohio.

Russell, Burdsall & Ward Bolt & Nut

Co., Port Chester, N. Y.

Solts—Stove
Cleveland (Ohio Cap Screw Co., The.
Lamson & Sessions Co., The, Cleveland,
Progressive Mfg. Co., Torrington, Conn.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nuk
Co., Port Chester, N. Y.

Bolts—Stove, Recessed Head American Screw Co., Providence, B. I. Bolts—T Slots

tandard Shop Equipment Co., Inc., Philadelphia, Pa.

lfs—Track

Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S.
Steel Corp. Subsidiary), Pittsburgh & Chicago.
Lamson & Sessions Co., The, Cleveland, Ohio.

Ohio. ennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birm-ingham, Ala.

Boring Bars
Bullard Co., The, Bridgeport, Conn.
Carboloy Co., Inc., 11153 East 8-Mile
Road, Detroit, Michigan.
Gairing Tool Co., The, Detroit.
Glaholt Machine Co., Madison, Wiscon-

Boring, Drilling & Milling Machines— Horizontal
Atlantic Machinery Corp., 149 Broadway, New York City.
Giddings & Lewis Machine Tool Co.,
Fond Du Lac. Wis.
Hill-Clarke Mehry. Co., 647 W. Washington Bled., Chicago,
Lucas Machine Tool Co., Cleveland.
Sellers. William, & Co., Inc., 1620
Hamilton St., Philadelphia, Pa.
Universal Boring Machine Co., Hudson,
Mass.

Universal Boring Machine Co., Hudson, Mass.

Boring & Drilling Machines—Vertical Baker Brothers, Inc., Toledo, Ohlo.
Bullard Co., The. Bridgeport, Conn.
Consolidated Machine To o I Corp.,
Rochester, New York.
Greenlee Bros., & Co., Rockford, Ill.
National Automatic Tool Co., Inc.,
Richmond, Ind.
Boring & Facing Machines—Horizontal
Simmons Machine Tool Corp., Albany,

fol Simmons Machine Tool Corp., Albany, N. Y. Boring Machines—Diamond & Carbide Tools

Ex-Cell-O Corp., 1210 Oakman Bivd., Detroit, Mich.

Heald Machine Co., The, Worcester, Mass. Heald Machine Co., The, Mass. Sheffield Corp., The, Gage Div., Day-ton, Ohlo.

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Blank & Buxton Machinery Co., Jackson, Mich.
Citesimati (Ohio) Bickford Tool Co.,
The
Fosdick Machine Tool Co., The, Cincinnati, Ohio.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

Pond Co., West Hartford, Conn.

Boring & Turning Milis—Vertical

Bullard Co., The, Bridgeport, Conn.
Cincinnati (ohio) Planer Co.
Rogers Machine Works, Inc., Alfred,
New York.

Sellers, William, & Co., Inc., 1620

Hamilton St., Philadelphia, Pa.

Hamilton St., Philadelphia, Pa.

Boxes—Shep
Factory Service Co., 4621 N. Twentyfirst St., Milwaukee, Wis.
Stackbin Corp., Providence, Rhode
Island.
Truscon Steel Co., Pressed Steel Div.,
Cleveland, Ohlo.

Cieveland, Onio.

Boxes—Stacking
Factory Service Co., 4621 N. Twentyfirst St., Milwaukee, Wis.
Stackbin Corp., Providence, Rhode
Island.
Truscon Steel Co., Pressed Steel Div.,
Cleveland, Ohio.

Brake Lining & Blocks—Asbestos
Johns-Manville Corp., 22 E. 40th St.,
N. Y. C.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.,
Towsend St., Passaic, N. J.

Brokes—Electric Cutler-Hammer, Inc., Milwaukee, Electric Controller & Mfg. Co., The, Cleveland.

Brakes—Magnetic Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

Brakes-Metal Forming Birdsboro (Pa.) Steel Foundry & Machine Co.
Bryant Machinery & Engineering Co., Chicago.
Chi ring Co., iv., 1115 Jersey.
O'Neil-Irwin Mfg. Co., 302-8th Ave.
S., Minneapolis, Minn.
Schatz Mfg. Co., The, Poughkeepsie, Scha.

Brazing Alloys
Handy & Harman, 82 Fulton St., New
York City.

Brick—Acid Resisting
Keagler Brick Co., Steubenville, Ohio. Brick—Insulating
Armstrong Cork Co., 978 Concord St.,
Lancaster, Pa.
Babcck & Wilco Co., The, 85 Liberty
St., N. T. C.

Broaches
Colonial Broach Co., Detroit.
Ex-Cell-O Corp., 1210 Oakman Blvd.,
Detroit, Mich.
National Broach & Machine Co., Detroit, Mich.

Broaching Machines
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Milling Mch. Co.,
The. ne. onial Broach Co., Detroit, as Machine Tool Co., Cleveland.

Bronze—Phosphor
American Brass Co., The, Waterbury, Conn. Brass Co., The. Wateroury,
Conn. Bridgeport (Conn.) Brass Co.
Bunting Brass & Bronze Co., The,
Toledo, Ohio.
Phosphor Bronze Smelting Co., The,
Philadelphia, Pa.
Revere Copper & Brass, Inc., 230 Park
Ave. New York City.
Seymour (Conn.) Mfg. Co., The.

Brushes—Industrial
National Carbon Co.. Inc., Carbon Sales
Div., Cleveland, Ohio.
Oaborn Manufacturing Co., The, Cleveland, Ohio.
Pittsburgh Plate Glass Co., Brush Div.
Baltimore, Md.

Battimore, Md.

Buckets—Clamshell, Grab, Dragline
Blaw-Knox Div. of Blaw-Knox Co.,
Blawnox, Pa.
Cullen-Friestedt Co., 1303 S. Kilbourn
Ave., Chicago.
Hayward Co., The, 50 Church St.,
N. Y. C.
Industrial Brownhoist Corp., Bay City,
Mich.
Wellman Engineering Co. Wellman Engineering Co., The, Cleve-land.

Buffers—Portable
Rotor Tool Co., The, Cleveland, Ohio,

Buildings & Bridges—Steel
American Bridge Co. (U. S. Steel Corp.
Subsidiary), Pittsburgh.

Pa.

Casters
Darnell Corp., Ltd., Long Beach, Calif.

American Rolling Mill Co., The, Middletown, Ohio, elmont Iron Works, Philadelphia. ilaw-Knox Div, of Blaw-Knox Co., Blawnox, Pa. ron & Steel Products, Inc., Chicago.

Iron & Steel

Ildozers

Ajax Mfg. Co., The, Cleveland, Ohio.

Beatty Machine & Mfg. Co., 936-150th

St., Hammond, Ind.

Cleveland Craus & Engineering Co.,

The Steelweld Mchry. Div., 1115 East

283rd St., Wickliffe, Ohio.

z83rd St., Wickliffe, Ohio.

zrners—Oil or Gas

Babcock & Wilcox Co., The, 85 Liberty
St., New York City.

St., New York City.

Springfield, Mass.

North American Mfg. Co., The, Cleveland, Ohio.

R-S Products Corp., Philadelphia, Pa.

Stewart Furnace Div. Chicago Flexible
Shaft Co., Chicago, Ill.

Surface Combustion Div. of General
Properties Co., Inc., 2375 Dorr St.

Toledo, Ohio.

Wean Engineering Co., Inc., The,
Warren, Ohio.

Wilson Lee Engineering Co., Cleveland,
Ohio.

rnishing Machines—Gear Fellows Gear Shaper Co., The, Spring-Fellows Gear Shaper Co., The, Spring-field, Vt.
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Burring Machines
National Broach & Machine Co., Detroit, Mich.
Sheffiel Corp., The, Gage Div., Dayton, Ohio.

Bushings—Bronze

Ampes Metal, Inc., Milwaukee, Wis.

Bunting Brass & Bronze Co., The,
Toledo, O. Toledo, O. Toledo, O. So. So. Mill St., New Castle, Pa.
Phosphor Bronze Smeiting Co., The Philadelphia, Pa.
Shenango-Penn Mold Co., Dover, Ohic.

Shenango-Penn Mold Co., Dover, Onic.

Bushings—Drill Jig
Ex-Cell-O Corp., 1210 Oakman Blvd.,
Detroit, Mich.

Bushings—Oilless
Bunting Brass & Bronze Co., The,
Toledo, Ohio.
Rhoades, R. W., Metaline Co., Inc.,
Long Island City, N. Y.

By-Product Plants Koppers Co., Engineering & Construc-tion Div., Pittsburgh.

Cable—Electric
American Steel & Wire Co. (U. S. Steel
Corp. Subsidiary). Cleveland, Ohio.
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., The, Cleveland.
Reebling's, John A., Sons Co., Trenton,
N. J.

Calcium Metal & Alloys
Electro Metallurgical Sales Corp., 30
East 42nd St., N. Y. C.

Hartford (Conn.) Special Machinery Co.,

Car Movers-Electric, Gasoline & Silent Hoist Winch & Crane Co., 851-63rd St., Brooklyn, N. Y.

Carbide
Air Reduction, 60 East 42nd St.,
N. Y. C. N. Y. C. Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

Carbon—Brick & Powder
National Carbon Co., Inc., Carbon Sales
Div., Cleveland, Ohio.

Div., Chroman.

Carburizing Boxes

American Manganese Steel Div. of The

American Brake Shoe & Foundry

Co., Chicago Heights, Ill. Cars—Dump Pressed Steel Car Co., Inc., Koppel Div., Pittsburgh, Pa.

Cars—Industrial and Mining
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Pressed Steel Car Co., Inc., Koppel Div., Pittsburgh, Pa.

Div., Pittsburgh, Pa.,

Cars—Ladle, Cinder & Slaq

Koppers Co., Bartlett Hayward Div.,

Baltimore, Md.

Pressed Steel Car Co., Inc., Koppel

Div., Pittsburgh, Pa.

Cars—Passenger, Railway
Budd, Edward G., Mfg. Co., Philadelphia, Pa.
Pressed Steel Car Co., Inc., Pittsburgh,
Pa.

Cars—Railway
Iron & Steel Products, Inc., Chicago,
Pressed Steel Car Co., Inc., Pittsburgh,
Pa.

Castings—Acid or Heat Resisting
Allegheny Ludium Steel Corp., Pitts-Allegheny Lucium Stees Coss., burgh, Pa. American Manganese Steel Div. of The American Brake Shoe & Foundry Co., Chicago Heights, Ill. Ampco Metal, Inc., Milwaukee, Wis. Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Phila-

delphia.

Hoskins Mfg. Co., Detroit, Mich.

Lebanon (Pa.) Steel Foundry.

Mechanite Research Institute, Pitts-Hosanis Mig. Co., Detroit, Santa. Lebanon (Pa.) Steel Foundry. Mechanite Research Institute, Pitts-burgh, Pa. Michiana Products Corp., Michigan City, Ind. Midvale Co., The, Nicetown, Phila., Pa. Ohio Steel Foundry Co., Lima, Ohio. Wall-Colimonoy Corp., Detroit, Mick.

Castings—Alloy Steel
Advance Foundry Co., The, Dayton,
Ohio, erican Manganese Steel Div. of The Imerican Brake Shoe & Foundry American Manganese Steel Div. of a American Brake Shoe & Foundry Co., Chicago Heights, Ill. Birdsboro (Pa.) Steel Foundry & Ma-chine Co. Hartford (Conn.) Electric Steel Corp. Lebanon (Pa.) Steel Foundry. Mackintosh-Hemphill Co., Pittsburgh.

Lebanon (Pa.) Steel Foundry,
Mackintosh-Hemphill Co., Pittsburgh,
Michiana Products Corp., Michigan
City, Ind.
Taylor-Wharton Iron & Steel Co., High
Bridge, New Jersey.
Uniteast Corp., Toledo, Ohio.

Castings—Brass, Bronze, Copper or Aluminum
Aluminum Co. of America, Pittsburgh.
Boose Aluminum Foundry Co., Reamstown, Pa. town, Pa,
Bunting Brass & Bronze Co., The, Toledo, Ohio.

ledo, Ohio. Cadman, A. W., Mfg. Co., Pittsburgh. Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Phila-delphic delphia.
oppers Co., Bartlett Hayward Div.,
Baltimore, Md.
ational Bearing Metals Corp., Pitta-

Battimoo.
National Bearing Metals
burgh.
Shenango-Penn Mold Co., Dover, Ohio.
Shenango-Penn Castings Co., Anniston,
Inc., Guil-Alabama.

Spencer's, I. S., Sons, Inc., Guilford, Ct.
United States Bronze Sign Co., Inc.,
570 Broadway, New York City.

Castings—Die
Aluminum Co. of America, Pittsburgh.
Titan Metal Mfg. Co., Bellefonte, Pa.

Titan Metal Mg. Co., Bellefonte, Pa.

Castings—Electric Steel
Continental Roll & Steel Foundry Co.,
East Chicago, Ind.
Crucible Steel Castings Co., Lansdowne, Pa.
Lebanon (Pa.) Steel Foundry.
Ohio Steel Foundry Co., Lima, Ohio.
Uniteast Corp., Toledo, Ohio. Castings—Gray Iron and Semi-Steel
Advance Foundry Co., The, Dayton,

Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, rican Engineering Co., Philadel-American Estimeters
phla.
Cox & Sons Co., The, Bridgeton, N. J.
Cramp Brass & Iron Foundries Div. of
The Baldwin Locomotive Wks., Philadelphia.
Etna Machine Co., The, Toledo, Ohio.
Judd, H. L., Co., Inc., 87 Chambers
St., New York City.
Koppers Co., Bartlett Hayward Div.,
Beltimore. Md. oppers Co., Bartlett Hayward Div., Baltimore, Md. obdell Car Wheel Co., Wilmington, Del.

National Roll & Fdry. Co., Avonmore, Pa. orth Wales (Pa.) Mach Co., Inc. outheastern Castings Co., Anniston, outheastern Castings Alabama.
Alabama.
Anencer's, I. S. Sons, Inc., Guil-

Castings—High Test & Alloy Iron
Cramp Brass & Iron Foundries Div. o
The Baldwin Locomotive Wks., Phila delphia.
Meehanite Research Institute, Pitts-burgh, Pa.
Michiana Products Corp., Michigan City, Ind.

Cuty, Ind.

Castings—Magnesium Alloys
American Magnesium Corp., 1701 Gulf
Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson
Ave., Midland, Mich.

Castings—Malleable
Fort Pitt Malleable Iron Co., Pittsburgh, Pa.
Lake City Malleable Co., The, 5100
Lakeside Ave., Cleveland.
Northern Malleable Iron Co., St. Paul, Minn.
Peoria (III.) Malleable Castings Co.
Saginaw Malleable Iron Div., General
Motors Corp., Saginaw, Michigan.

American Manganese Steel
American Manganese Steel Div. of The
American Brake Shoe & Foundry
Co., Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co., High
Bridge, New Jersey,

Castings—Meehanite Metal
Meehanite Research Institute, Pittsburgh, Pa.
Castings—Monel & Nickel
Cramp Brass & Iron Foundries Div. of
The Baldwin Locomotive Wks., Phildelphia.

C

The Baldwin Locomotive Wks., Phildelphia.

Castings—Phosphor Bronze
Bunting Brass & Bronze Co., The,
Toledo, Ohio.
Phosphor Bronze Smelting Co., The,
Philadelphia, Pa.

Castings—Steel
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., The, Middictown, Ohio.
Bethlehem (Pa.) Steel Company.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Carnegie-Illinois Steel Corp. (U. S.
Steel Corp. Subsidiary), Pittsburgh &
Chicago.
Columbia Steel Co, (U. S. Steel Corp.
Subsidiary), San Francisco, Calif.
Continental Roll & Steel Foundry Co.,
East Chicago, Ind.
Crucible Steel Castings, Lansdowne,
Pa.
Erie (Pa.) Forge Co.

Continental Roll & Steel Foundry Co.,
East Chicago, Ind.
Crucible Steel Castings, Lansdowne,
Pa.
Erie (Pa.) Forge Co.
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
Michiana Products Corp., Michigan
City, Ind.
Ohio Steel Foundry Co., Lima, Ohio.
Saginaw Malleable Iron Div. General
Motors Corp., Saginaw, Mich.
Standard Steel Was, Div. The Baldwin
Locomotive Works, Phila., Pa.
Strong Steel Foundry Co., Buffalo, N. Y.
Uniteast Corp., Toledo, Ohio.
Castings—Wear Resisting
Lebanon (Pa.) Steel Foundry,
Meehanite Research Institute, Pittaburgh, Pa.
Saginaw Malleable Iron Div., General
Motors Corp., Saginaw, Michigan.
Taylor-Wharton Iron & Steel Co., High
Bridge, New Jersey.
Wall-Colmonoy Corp., Detroit, Mich.
Cement—Acid-Proof
Pennsylvania Sait Mfg. Co., Philadelphia, Pa.
Cement—Refractory
Babcock & Wilcox Co., The, 85 Liberty
St., New York City,
Holden, A. F., Co., The, New Haven,
Conn.

Conn.
Johns-Manville Corp., 22 East 40th St.,
New York City.

New York City.

Centering Machines
Hendey Machine Co., Torrington, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Sundstrand Machine Tool Co., Bockford,
Ill.

III.

Centers—Lathe & Grinder, Carbidetipped
McKenna Metals Co., Latrobe, Pa.

Choins—Conveyor & Elevator
American Brake Shoe & Foundry
Co., Chicago Heights, III.
Link-Belt Co., 220 So. Belmont Ave.
Indianapolis, Ind.

Chains—Power Transmission
Link-Belt Co., 220 So. Belmont Ave.,
Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Pyott Foundry & Machine Co., Chicago,
Ill.
Whitney Chain & Mfg. Co., Hart-Thitney Chain & Mfg. Co., Hart-ford, Ct.

Chains—Welded
American Chain & Cable Co., Inc.,
York, Pa.

Chamfering Machines (Gear) Sheffield Corp., The, Gage Div., Day-Sheffield Corp., The, of ton, Ohio.
Channels—See Angles

Checks-Metal
Cunningham, M. E., Co., Pittsburgh, Cunningham, M. E., Co., The, E. Pa. Noble & Westbrook Mfg. Co., The, E. Hartford, Coun.

Hartford, Conn.

Chemicals—Industrial

DuPont de Nemours, E. I., & Co.,
Inc., Electrochemicals Dept., Wilmington, Del.

Koppers Co., Tar & Chemical Div.,
Pittsburgh, Pa.
Pennsyivania Salè Mfg. Co., Philadelphia, Pa.

Chisels Cleveland (Ohio) Punch & Shear Works Co., The. Cleveland Steel Tool Co., The, 660 East 82nd St., Cleveland, Ohlo.

82nd St., Cleveland, Ohio.

Chromium Metol & Alloys
Electro Metallurgical Sales Corp., 30
East 42nd St., N. Y. C.

Vanadium Corp. of America, 420 Lexington Ave., New York City.

ington Ave., New York City.

Chucking Machines
Baird Mch. Co., The, Bridgeport, Conn.,
Cleveland (Ohio) Automatic Machine
Co., The,
Gisholt Machine Co., Madison, Wis.

Goss & DeLeeuw Machine Co., New Britain, Conn. Jones & Lamson Machine Co., Spring-field, Vt. National Acme Co., The, Cleveland. New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain Conn. Britain, Conn.

Potter & Johnston Machine Co., Paw-tucket, R. I.

tucket, R. I.

Chucks—Air Operated

Alrgrip Chuck Div. Anker-Holth Mfg.
Co., Chicago, Ill.
Logansport (Ind.) Machine, Inc.
Tomkins-Johnson Co., The, Jackson,

Chucks—Drill Cleveland The. (Ohio) Twist Drill Co., The.
Cushman Chuck Co., Hartford, Conn.
Millers Falls Co., Greenfield, Mass.
Morse Twist Drill & Mach. Co., New
Bedford, Mass.
North Bros. Mfg. Co., Philadelphia, Pa.

Chucks—Lothe
Cushman Chuck Co., Hartford, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.

Chucks-Magnetic
Brown & Sharpe Mfg. Co., Providence, R. I. Heald Machine Co., The, Worcester, Taft-Pierce Mfg. Co., The, Woonsocket, R. I.

Clay Guns Bailey, Wm. M., Co., Pittsburgh, Pa. Ford, J. B., Sales Co., The, Wyandotte, Mich.
Holden, A. F., & Co., The, New Haven, Holden, A. F., & Co., The, New Haves, Conn.
Houghton, E. F., & Co., Philadelphia, Pa.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., 46 South Ave., Garwood, N. J.
Oakite Products, Inc., 22 Thames St., New York City.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Conveying and Electric Products Co., Detroit, Mich.
Culter-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
General Electric Co., Schenectady, N. Y.
Conveying and Elevating Whiting Copp., 15601 Lathrop Ave., Harvey, Ill.

Cleaners, Vacuum—Industrial Spencer Turbine Co., The, I

Cleaning Equipment (Metal)—Elec-tro-Chemical
Bullard-Dunn Div., The Bullard Co., Bridgeport, Cenn.
Meaker Co., The, Chicago, Ill.

Meaker Co., 200,

Glutches
Dodge Mfg. Corp., Mishawaka, Ind.
Fairbanks, Morse & Co., Chicago,
Fails Clutch & Mchry. Co., The,
Cuyahoga Falls, Ohio.
Hill Acme Co., The, Cleveland, Ohio.
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, N. Y.
Twin Disc Clutch Co., Racine, Wis.

Twin Disc Clutch Co., Racine, Wis.
Clutches—Magnetic
Cutler-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., 517 E.
Smith St., Milwaukee.
Steams Magnetic Mfg. Co., 635 So.
28th St., Milwaukee.

Core Oil
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Koppers Coal Co., The Pittsburgh.
Cocl. Ore & Ash Handling Machinery
Alliance (Ohio) Machine Co., The.
Alvey-Freguson Co., The, 711 Disney
St., Cincinnati, Ohio.
Link-Belt Co., 300 West Pershing
Road, Chicago, Ill.

Core Oil
Houghton, E. F., & Co., Philadelphia, Pa.
Scoony-Vacuum Oil Co., Inc., 26
Braadway, New York City.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17
Battery Place, N. Y. C.
Cotter Pins
American Chain & Cable Co., Inc., York, Pa.

Cobalt Metal Central Trading Corp., 511 Fifth Ave.,

Onio.
Yoder Co., The, Cleveland, Onio.
Columbium
Electro Metallurgical Sales Corp., 30
E. 42nd St., N. Y. C.

E. 42nd St., N. Y. C.

Combustion Controls

Brown Instrument Co., The, Philadelphia, Pa.

Leeds & Northrup Co., 4956 Stenton
Ave., Philadelphia.

Morgan Construction Co., Worcester,
Mass.

North America, 266

Mass.
North American Mfg. Co., The, Cleveland, Ohlo.
Compounds—Drawing and Catting
Gulf Oil Corp., Gulf Refining Co.,
Pittsburgh.
Houghton, E. F., & Co., Philadelphis,
Pa.

Magnus Chemical Co., 46 South Ave., Gardwood, N. J.
Oakite Products, Inc., 22 Thames St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City,
Standard Oil Co. (Indiana), Chicago,
Stuart, D. A. Oil Co., Ltd., Chicago,
Ill. III.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.
mpressors—Air
Allis-Chalmers Mfg. Co., Milwaukee,
Wis.

Mile-Cnaimers Mfg. Co., Milwaukee, Wis.
Curtis Pneumatic Mchry. Div. of Curtis Mfg. Co., 1948 Kienlen Ave., St. Louis, Mo.
DeVilbiss Co., The, Toledo, Ohio.
Fairbanks, Morse & Co., Chicago.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., The, Hartford, Conn.
Worthington Pump & Machinery Corp., Harrison, New Jersey.

Compressors—Gas
Worthington Pump & Machinery Corp.,
Harrison, New Jersey.

Condensers—Surface & Jet
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Westinghouse Electric & Mfg. Co., East
Pittsburgh, Pa.
Worthington Pump & Machinery Corp.,
Harrison, New Jersey.

Contour Machining Attachment
Detroit (Mich.), Universal Duplicator
Co., 214 St. Aubin St.

Controllers-Electric
Adam, Frank, Electric Co., St. Louis, Mo. Allis-Chalmers Mfg. Co., Milwaukee, Allis-Chaimers Mrg. Co., Milwaukee, Wis. Bull Dog Electric Products Co., Detroit, Mich. Culler-Hammer, Inc., Milwaukee. Electric Controller & Mrg. Co., The, Cleveland. General Electric Co., Schenectady, N. Y.

dustrial
The, Hartford,

(Metal)—ElecThe Bullard Co.,

Cago, Ill.

Harvey, Ill.

Conveying and Elevating Machinery
Alvey-Ferguson Co., The, 711 Disney
St., Cincinnati, Ohio.
Link-Belt Co., 300 West Pershing
Road, Chicago, Ill
Logan Co., Inc., Louisville, Ky.
Mathews Conveyor Co., Ellwood City,
Pa.

Conveyor Worms
Lee Spring Co., Inc., 30 Main St.,
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Logan Co., Inc., Louisville, Ky.
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Torrington (Conn.) Mfg. Co., The.

Coke—Metallurgical
Cleveland-Cliffs Iron Co., The, Cleveland. Western Wire Prods. Co., St. Louis, Mo.

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Coke Oven Machinery
Koppers Co., Engineering & Construction Div., Pittsburgh.

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The Cleveland, Ohio.

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Medart Co., The, St. Louis, Mo.
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Poole Foundry & Meh. Co., Baltimore,
Md.

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Twin Disc Clutch Co., Racine, Wis.
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SHAPE Stainless Steel supplies continue to be in a critical condition. On top of that, the PAGE Mills are at capacity doing everything in our power to supply any and every demand made upon us to successfully prosecute this war.

If possible, use alternatives to Stainless Steel, specify a standard shape, design to reduce waste, save all your scrap.

TWO THINGS WE SUGGEST:

- 1. Adopt a standard shape for Stainless Steel Wire. Avoid special runs and the maintenance of special dies.
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Morgan Engineering Co., The, Alliance, O.

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Cox & Sons Co., The, Bridgeton, N. J.
Landis Mch. Co., Wayneboro. Pa.
Peerless Machine Co., 1613 Junction
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DeSanno, A. P., & Son, Inc., Phoenixville, Pa.
Tabor Mfg. Co., The, Philadelphia, Pa.

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Carborundum Co., The Niagara Falls,
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DeSanno, A. P., & Son, Inc., Phoenix-

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Airgrip Chuck Div. Anker-Holth Mfg.
Co., Chicago, Ill.
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Taylor-Wharton Iron & Steel Co., High
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Cylinders—Seamless
Harrisburg (Pa.) Steel Corp.
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Budd, Edward G., Mfg. Co., Philadelphia Pa.

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O'Neil-Irwin Mfg. Co., 302—8th Ave. S., Minneapolis, Minn.
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Taft-Peirce Mfg. Co., The, Woonsocket, R. 1. ster (Mass.) Stamped Metal Co., 6

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Greenlee Bros. & Co., Rockford, Ill.
Henry & Wright Mfg. Co., The, Hartford, Conn.
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Rotor Tool Co., The, Cleveland, Oblo.
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Road, Cincinnati, Oblo.
Stanley Electric Tool Div., The, Stanley Works, New Britain, Conn.

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Leland-Gifford Co., Worcester. Mass.
Walker-Turner Co., Inc., Plainfield,
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Baker Brothers, Inc., Toleco, Ohio.
Bryant Machinery & Engineering Co.,
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Cleveland (Ohio) Punch & Shear Works
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Shreveport (La.) Engineering Co. Felt-Wool Mechanicot
American Felt Co., Gle..ville, Conn.

American Felt Co., Gle.ville, Conn.

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Vanadium Corp., of America, 420 Lexington Ave., New York City.

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Vanadium Corp. of America, 420 Lexington Ave., New York City.
Files & Rosps
Atkins, E. C., & Co., 406 So. Illinois

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Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Nicholson File Co., Providence, R. I.

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Sparkler Mfg. Co., 218 Lake St.,
Mundelein, Ill.

Filters—Oil
National Acme Co., The, Cleveland.

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Flame Treating & Engineering Co., The. Hartford. Coun.
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Linde Air Products Company. The, 30 East 42nd St., New York City.
National Cylinder Gas Co., Chicago, Ill.
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Kropp Forge Co., Chicago, Ill.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Fa.
Flanges—Welded Steel

King Fifth Wheel Co., 2915 N. Second St., Philadelphia.

Flasks—Foundry
Truscon Steel Co., Pressed Steel Div.,
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Kent Ave., Brooklyn, N. Y.
Lovejoy Flexible Coupling Co., 4979
Lake St., Chicago, Ill.

Waiker-Turner Co., Inc., Plainfield,
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delphia, Pa.

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Carey, Philip, Mfg. Co., The, Cincinnati, O.
Johns-Manville Corp., 22 East 40th St.,
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Steel Corp. Subsidiary), Pittsburgh
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Inland Steel Co., Chicago.

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York City

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East 42nd St., N. Y. C.

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Cramp Brass & Iron Foundries Div. of
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Harvey Metal Corp., The. Chicago, Ill.
Revere Copper & Brass, Inc., 230 Park
Ave., New York City.
Titan Metal Mig. Co., Bellefonte, Ps.
Transue & Williams Steel Forging
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Atlas Drop Forge Co., Lansing, Mich.
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& Chicago.
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Herbrand Corp., The, Fremont, Ohio.
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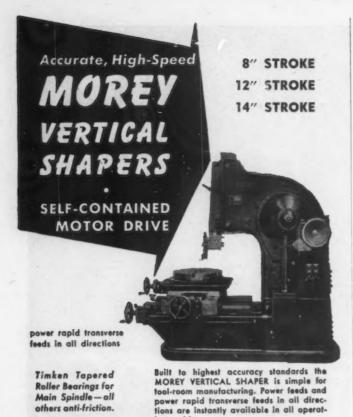
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Hoists—Monorail
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American Monorall Co., The, Cleveland.
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Hose—Flexible Metallic
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Continental Roll & Steel Foundry Co., East Chicago, Ind.
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Lake Erle Engineering Con., 68 Kenmore Sta., Buffalo, N. Y.
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Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.
Wood, R. D., & Co., Philadelphia, Pa.
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Induction Heating Corp., 389 Lafayette St., New York City.
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St. Acc.

Ohio Crankshaft Co., The, Carrenas, Ohio.

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Valley Mould & Iron Corp., Hubbard, Ohio.

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Aluminum Co. of America, Pittsburgh, Ingots—Phosphor Bronze

Phosphor Bronze Smelting Co., The, Philadelphia, Pa.

Inspection Apparatus—Magnetic

Magnaflux Corp., 5902 Northwest Highway, Chicago, Ml.

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way, Chicago, and Struments—Electric, indicating & Recording Brown Instrument Co., The, Philadelphia, Pa. General Electric Co., Schenectady, phia, P.
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Physicists Research Co., Ann Arbor, Mich.
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Johns-Manville Corp., 22 East 40th St.,
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Van Dorn Iron Works Co., The, Cleveland, Ohio.
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Hecker, A. W., 1980 East 66th St.,

Jigs and Fixtures
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Davis Keyseater Co., 490 Exchange St.,
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Rhoads, J. E., & Sons, Philadelphia,
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Sundstrand Machine Tool Co., Rockford,
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Lather—Engine & Toolroom

ford, III.

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Axelson Mfg. Co., Los Angeles, Calif.

Bryant Machinery & Engineering Co., Bryant Machinery Chicago, Chicago, Ghiclinnati (Ohio) Lathe & Tool Co. Cincinnati (Ohio) Lathe & Tool Co. Hendey Machine Co., Torrington, Coun. Hill-Clarke Mchry, Co., 647 W. Washington Blvd., Chicago. LeBlond, R. K., Mch. Tool Co., Cincinnati.

cinnati.
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Lodge & Shipley Machine Tool Co.,
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Mesta Mch., Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.
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Schauer Machine Co., 2069 Reading
Road, Cincinnati, Ohio.

athes—Turret
Acme Machine Tool Co., The, Cincinnati, Ohio.
Bardons & Oliver, Inc., Cleveland.
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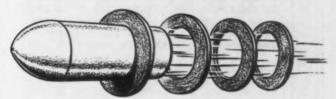
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Packing—Leather
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Rhoads, J. E., & Sons, Philadelphia,

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Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.

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Republic Steel Corp., Clereland, Ohio. Tennessee Coal, Iron & Rallrad Co.

U. S. Steel Corp., Subsidiary), Birmingham, Ala.

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Jackson (Ohio), Iron & Steel Co., The.

Piling—Iron & Steel

American Rolling Mill Co., The, Middiecom, Ohio.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Inland Steel Co., Chicago, Ill.

National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

Pillow Blocks

Overs—Coke and By-Product Receivery
Koppers Co., Engineering & Construction Div., Pittsburgh.

Ovens—Core and Mold
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Mahon, R. C., Co., Detroit, Mich.
Mata Mch. Co., Pittsburgh.

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Patternation Div., Pittsburgh.

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Bridgeport (Conn.) Brass Co.
Revere Copper & Brass, Inc., 230 Park
Ave., New York City.
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National Carbon Co., Inc., Carbon Sales
Div., Cleveland, Ohio.
Pipe—Cast Iron, 8 & 5 & Flanged
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Pipe—Lead Lined
National Lead Co., 111 Bdway.,
X, C.
Pipe—Speel
Albert & Davidson Pipe Corp., 2nd Apr.

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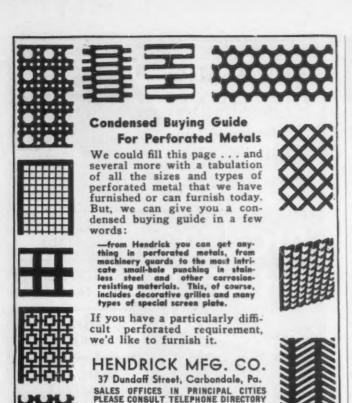
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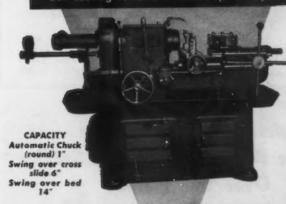
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Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Continental Steel Corp., Kokomo, Ind. Inland Steel Co., Chicago.
Johns-Manville Corp., 22 East 40th St., New York City.
Newport (Ky.) Rolling Mill Co., The, Div., of The Andrews Steel Co., Republic Steel Corp., Cleveland, Ohio. Superior Sheet Steel Co., The, Canton, Ohio.
Wheeling Siding—Zinc
New Jersey Zinc Co., The, Canton, Ohio.
St., New York City.
Roofing Materials
Carey, Philip Mfg. Co., The, Cincinnati O.
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.
Rust Preventives
Alrose Chemical Co., Cranston, Prov., R. I.
Houghton, E. F., & Co., Philadelphis,

Airose Chemical Co., Cranston, R. I.
Houghton, E. F., & Co., Philadelphia,

R. I.
Houghton, E. F., & Co., Philadelphia,
Pa.
Michigan Chrome & Chemical Co., 6338
East Jefferson Ave., Detroit, Mich.
Mitchell-Bradford Chemical Co., The,
Bridgeport, Com.
Udylite Corp., The, Detroit, Mich.
Russ Proofing Process
Enterprise Galvanizing Co., Philadelphia.
Mahon, R. C., Co., Detroit, Mich.
Southern Galvanizing Co., Baltimore,
Md.
Udylite Corp., The, Detroit, Mich.
Soit Candy
Hardie Brothers Co., Pittsburgh, Pa.
Soit Teolets
Hardie Brothers Co., Pittsburgh, Pa.

Hardie Brothers Co., Pittsburgh, Pa. Sult Tcblets
Hardie Brothers Co., Pittsburgh, Pa. Morton Salt Co., Chicago, Ill.
Sand Blast Equipment—See Blast Cleaning Equipment
American Foundry Equipment American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawka, Ind. Hydro-Blast Corp., The, Chicago, Ill. Link-Belt Co., 300 West Pershing Road, Chicago, Ill.
Saw Filing & Grinding Machines
Atkins, E. C. & Co., 466 So. Illinois
St., Indianapolis, Ind.
Sawing Machines—Cold Saw
Espen-Lucas Meh, Works, Phila.
Motch & Merryweather Mehry. Co.,
The, Cleveland.

Peerless Machine Co., 1613 Junction Ave., Racine, Wis, Racine (Wis.) Tool & Machine Co.

Morgan Construction Co., Worcester Mass.

Morgan Engineering Co., The, Alliance, O.

National Roll & Fdry, Co., Avonmore, Pa.

Torrington (Conn.) Mfg. Co., The.
United Engineering & Fdry, Co., Ptgh.
Waterbury (Ct.) Farrel Fdry, & Mch.

Co., The.

Dills—Alloy Steel

Morgan Construction Co., Worcester Marker (Wis.) Tool & Machine Co.

Swing Machines—Metal—Band
Armstrong-Blum Mfg. Co., Co., 406 80. Illinois St., Indianapolis, Ind.
Continental Machines, Inc., 1311 S.

Washington Ave., Minneapolis, Minn.
Walker-Turner Co., Inc., Plainfield,
N.J.

Walker Swing Corp., Three Rivers, Mich.

Sawing Machines—Power Hack
Armstrong-Blum Mfg. Co., Chicago.
Atkins. E. C. & Co., 406 So. Illinois
St., Indianapolis, Ind.
Peerless Machine Co., 1613 Junction
Ave., Racine, Wis.

Ave., Racine, Wis.

Saws—Band for Metal

Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C. & Co., 406 So. Illinois
St., Indianapolis, Ind.,
Continental Machines, Inc., 1311 S.
Washington Ave., Minneapolis, Minn.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Peerless Machine Co., 1613 Junction
Ave., Racine, Wis.
Wells Mfg. Corp., Three Rivers, Mich.

Wells Mfg. Corp., Three Rivers, Mich.

Sows—Cold Saw

Atkins, E. C. & Co., 406 So. Illinois

St., Indianapoils, Ind.

Espen-Lucas Machine Works, Philadelphia, Pa.

Motch & Merryweather Machinery Co.,

The, Cleveland,

Peerless Machine Co., 1613 Junction

Ave., Racine, Wis.

Tabor Mfg. Co., The, Philadelphia, Pa.

Tabor Mrg. Co., The, Philadelphia, Pa.
Saws—Friction
Atkins, E. C. & Co., 406 So. Illinois
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Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Kling Bros. Engineering Works, Chicago, Ill.
Saws—Hack Saw Biodes
Armstrong, Mrg. Co. Chicago

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Saws—Hock Saw Blodes

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Atkins, F. & Co., 406 So. Illinois
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Disston, Horry, & Sons, Inc., Philadelphi, F. & Sons, Inc., Philadelphi, P. & Sons, Inc., Philadelphi, P. & Sons, Inc., Philadelphia, P. & Sons, Ind.

St., Indianapolis, Ind.
Greenfield (Mass.) Tap & Die Corp., Peerless Machine Co., 1613 Junction Are., Racine, Wis.

Scales

Scales
Fairbanks, Morse & Co., Chicago,
Toledo (Ohio), Scale Co.
Scrap Baiers—See Baiing Presses
Scrap Bundling Machines
Cox & Sons Co., The, Bridgeton, N. J.
Scrap-iron & Steel
Dreifus, Charles, Co., The, Philadelphia, Pa.
Iron & Steel Products, Inc., Chicago,
Ill.
Screens—Equators

III.
reens—Foundry
Allis-Chalmers Mfg. Co., Milwaukee,
Wis.
Buffalo (New York) Wire Works Co., Inc. . Wickwire Brothers, Inc., Cortland, New York

York.
reen:—Perforated Metal
Chicago Perforating Co., 2440 W. 24th
Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdie Perforating Co., Rochesber, New
York. York.

Harrington & King Perforating Co.,
The, Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas. A., Sons, 59 Fairmount
Ave., Jersey City, N. J.

Screens—Woven Wire
Buffalo (New York) Wire Works Co.,
Inc.

Inc. Ludlow-Saylor Wire Co., The, St. Louis, Wickwire Brothers, Inc., Cortland, New

York.
Wickwire Spencer Steel Co., 500 Fifth
Ave., N. Y. C.
Screw Driving Tools
North Bros, Mfg. Co., Philadelphia, Pa.
Screw Machine Products
Blake & Johnson Co., The, Waterville,
Conn. Conn.
Commonwealth Brass Corp., Detroit,
Mich.
Eastern Mch. Screw Corp., New Haven,

Ct.

Ct.

Eriesson Screw Mch. Products Co., Inc., 25 Lafayette St., Bklyn., N. Y.

Mid-West Screw Products Co., 20 St. George St., St. Louis. Mo.

Miles, Franklin S., 2422-28 N. Mascher St., Phila., Pa.

National Acme Co., The, Cleveland.

New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Com.

New England Screw Co., Keene, N. H.

Olson Mfg. Co., Warcester, Mass.
Ottemilier, Wm. H., Co., Inc., York,
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Peck Spring Co., The, Plainville, Conn.
R & I. Tools, Philadelphia, Pa.
Heilance Machine & Mfg. Co., 30 Irving
Place, N. Y. C.
Rhode Island Tool Co., Providence,
R. I.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Wicaco Machine Corp., The, Philadelphia, Pa.

phia, Pa.

Screw Machine Tools

R & L Tools, Philadelphia.

Screw Machinery—Automatic
Acme Machine Tool Co., The, Cincin-

Acme Machine Tool Co., The, Cincinnati, Ohio.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland (Ohio) Automatic Machine Co., The
Cone Automatic Machine Co., Inc.,
Windsor, Vt.
Greenlee Bros. & Co., Rockford, Ill.
National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div.,
The, New Britain Machine Co., New Britain, Conn.

Britain, Conn.
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Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vf.
Warner & Swasey Co., The, Cleveland.

Screw Plates
Greenfield (Mass.) Tap & Die Corp.
Screws—Cap, Set, Safety Set & Machine
Blake & Johnson Co., The, Waterville,

Blake & Johnson Co., The, Waterville, Conn.
Cleweland (Ohio) Cap Screw Co., The.
Continental Screw Co., New Bedford,
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Ericsson Screw Mch. Products Co., Inc.,
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Harper, H. M., Co., The, 2607 Fletcher
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Lamson & Sessions Co., The, Cleveland.
Mid-West Screw Products Co., 20 St.
George St., St. Louis, Mo.
National Acme Co., The, Cleveland.
New England Screw Co., Keene, N. H.
Ottemiller, Wm. H., Co., Inc., York,
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Parker-Kalen Corp., 200 Varick St.

Pa.
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New York City.
Progressive Mrg. Co., The, Terrington,
Conn. Rhode Island Tool Co., Providence, R. I.

I. ell. Burdsall & Ward Bolt & Nut L. Port Chester, N. Y. ner, Samuel J., & Sons, Inc., Mil-

Russell, Burusan S., V.
Co., Port Chester, N. Y.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Triplex Screw Co., The, Cleveland, Ohio.
Screws—Recessed Head
American Screw Co., Providence, R. I.
Continental Screw Co., New Bedford, Mass.
Lamson & Sessions Co., The, Cleveland, Ohio.
Parker-Kalon Corp., 200 Varick St., New York City,
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Screws—Self Tapping Drive

Co., Fort Chester, N. X.

Screws—Self Tapping Drive

Continental Screw Co., New Bedford,
Mass.

New England Screw Co., Keene, N. H.

Parker-Kalon Corp., 200 Varick St.,

New York Chy.

Shakeproof, Inc., 2525 N. Keeler Ave.,

Chicago.

Separators—Magnetic
Dings Magnetic Separator Co., 517, East
Smith St., Milwaukee.
Ohio Electric Mfg. Co., The, 5908
Maurica Ava., Cleveland.
Steams Magnetic Mfg. Co., 635 S. 28th
St., Milwaukee.

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Erie (Pa.) Forge Co.
Jones & Laughlin Steel Corp., Pitts-Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel & Co., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Div. Republic Steel
Corp., Massilion, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.
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Cincinnati (Ohio) Shaper Co., The.
Hendey Machine Co., Torrington, Conn.
Shapers—Vertical
Pratt & Whitney Div. Niles-BementPond Co., West Hartford, Coun.
Shear Blades & Knives
American Shear Knife Co., Homestead,
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American Shear Knife Co., Homesteau, Pa.
Atkins, E. C. & Co., 408 So. Illinois St., Indianapolis, Ind.
Clereland (Ohio) Punch & Shear Works
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Heppenstall Co., Pittsburgh.
Hill Acme Co., The, Clereland, Ohio.
Hill Acme Co., The, Canton Div., 6406
Breakwater Ave., Cleveland. Ohio.
Quickwork-Whiting Div. Whiting Corp.,
15601 Lathrop Ave., Harvey, Ill.

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Actna-Standard Engineering Co., The,
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Beatty Machine & Mfg. Co., 936-150th

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Bertsch & Co., Cambridge City, Ind.

Beverly Shear Co., Chicago, Ill.

Buffalo (N. Y.) Forge Co., 492 Broadway

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Ohio, Mesta Machine Co., Pittsburgh, Pa. Morgan Engineering Co., The, Alliance,

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O Neil-Iwin Mrs. Co., 302 8th Ave.
S. Minneapolis, Minn.
Quickwork-Whiting Div. Whiting Corp.,
15001 Lathrop Ave., Harvey, Ill.
Schatz Mrs. Co., The, Poughkeepsle,
N. X. United Engineering & Fdry. Co., Ptgh. Yoder Co., The Cleveland, Ohio,

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Hill Acme Co., The, Canton Div., 6400
Breakwater Ave., Cleveland, Ohio.

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Ave., Brooklyn, New York.

Cleveland (Ohio) Punch & Shear Works
Co., The.

Niagara Machine & Tool Works,
Buffalo, N. Y.

Quickwork-Whiting Div. Whiting Corp.,
15601 Lathrop Ave., Harvey, Ill.

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Niagara Mach. & Tool was...
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Stanley Electric Tool Div., The Stanley Works, New Britain, Conn.
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Andrews Steel Co., The, Newport, Ky.
Continental Steel Corp., Kokomo, Ind.

Continental Steel Corp.,

Sheet Lifters
Cullen-Friestedt Co., 1303 S. Kilbourn
Chicago.

Ave., Chicago.
Sheet Metal Fabrication
Kirk & Blum Mfg. Co., The, Cincinnati, Ohio.
Sheet Metal Machinery

Beverly Shear Co., Chicago, Ill.
Bliss, E. W., Co., 53rd St. & Second
Ave., Brooklyn, N. Y.
Cincinnati (Ohio) Shaper Co., The.
Cleveland (Ohio) Punch & Shear Works Cleveland (Villey, Co., Chicago, Co., The & Krump Mfg. Co., Chicago, Ferracute Machine Co., Bridgeton, New Jersey, New Albany (Ind.) Mch. Mfg. Co. Niagara Mach. & Tool Wks., Buffalo,

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Ohio.

Tennessee Coal, Iron & Railroad Co.
(U. S. Steel Corp., Subsidiary), Birmingham, Ala.,
Welrton (W. Va.) Steel Co.
Wheeling (W. Va.), Steel Corp.
teets—Blue Annealed
Alan Wood Steel Co., Conskohocken,
Pa.
American Rolling Mill Co., The, Middletown, O. Pa,
American Rolling Mill Co., The, Middeltown, O.
Bethlehem (Pa.) Steel Company,
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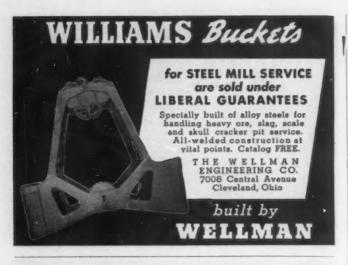
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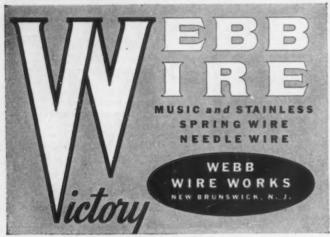


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Seymour (Conn.) Mg. Co., The.

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Newport (Ky.) Rolling Mill Co., The,
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Republic Steel Corp., Clereland, Ohio.
Superior Sheet Steel Co., The, Canton,
Ohio.
Wheeling (W. Va.) Steel Corp.

Ohio.

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Sheets—Electrical

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Carnegie-Illinois Steel Corp. (U. S.
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Granite City (III.) Steel Co.

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& Chicago.

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Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
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Republic Steel Corp., Cleveland, Ohio.
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The.

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Steel Corp. Subsidiary), Pittsburgh & Chicago.

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.

Continental Steel Corp., Kokomo, Ind.

Granite City (III.) Steel Co.

Great Lakes Steel Corp., Ecorse, Detroit. Mich.

Inland Steel Co., Chicago.

Newport (Ky.) Rolling Mill Co., The,

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Republic Steel Corp., Cleveland, Obio.

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cago.
Superior Sheet Steel Co., The, Canton,
Ohio. Olio.
Tennessee Coal, Iron & Railroad Co.
(U. S. Steel Corp. Subsidiary), Birmingham. Ala.
Weltron (W. Va.) Steel Co.
Wheeling (W. Va.), Steel Corp.
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The.
Sheets—Lead
National Lead Co., 111 Bdway, N. Y. C.
Sheets—Long Terne
American Rolling Mill Co., The, Middletown, Ohlo.

American Rolling Mill Co., The, Middletown, Ohio.
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Continental Steel Corp., Kokomo, Ind.
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Div. of The Andrews Steel Co.
Superior Sheet Steel Co., The, Canton,
Ohio.

Ohio. Wheeling (W. Va.), Steel Corp.

Sheets—Magnesium Alloys American Magnesium Corp., 1701 Gulf Bidg., Pittsburgh. Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich. Sheets—Stoinless

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Sheefs—Stainless
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American Rolling Mill Co., The, Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Sheets—Stainless Clad
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Grantte City (Ill.) Steel Co.
Ingersoll Steel & Disc Div. Borg-Warnet Corp., Chicago, Ill.
Sheets—Tin Mill Black
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New Jersey Zinc Co., The, 160 Front St., New York City.

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St., New York City.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Silicon—Aluminum
Vanadium Corp. of America, 420 Lexington Ave., New York City.

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Slings—Wire Rope
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Roebling's, John A., Sons Co., Trenton, N. J.

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Kester Solder Co., Chicago, Ill.
Special Machinery
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Bayard, M. L., & Co., Inc., Philadelphia, Pa.
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Birdaboro (Pa.) Steel Foundry & Machine Co.

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Cleveland (Ohio) Automatic Machine Co., The.

Bridgeport, Conn.

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Denison Engineering Co., The, 1160

Dublin Rd., Columbus, Ohio.

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Eastern Tool & Mfg. Co., Bloomfield, N. J.

Fidelity Machine Co., Philadeliphia, Pa.

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Hall Acme Co., The, Cleveland, Ohio.

Co., The, Cleveland, Ohio, Hydro-Blast Corp., The, Chleago, Ill. Koppers Co., Bartlett Hayward Div., Baltimore, Md. Morgan Engineering Co., The, Alliance, Ohio.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I. R. I.

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Thomas Mch. Mfg. Co., Pittsburgh.
Torrington (Com.) Mfg. Co., The.
Weatherly (Pa.) Foundry & Mfg. Co.
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Wood, R. D., & Co., Philadelphia, Pa.
weed Reducers
Cleveland (Ohio) Worm & Gear Co.,
The, 2522 E. 80th Street.
Link-Beis Co., 2043 West Hunting Park
Ave., Phila., Pa.
Poole Feastdry & Mch. Co., Baltimore,
Md.
Twin Disc Clutch Co., Racine, Wis.

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Spiegeleisen
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42nd St., N. Y. C.
New Jersey Zinc Co., The, 160 Front
St., New York City.

Spikes—Track
Carnegie-Illinois Steel Corp. (U. S.
Steel Corp. Subsidiary), Pittsburgh
& Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.

Spindles—Boring
Shemeld Corp., The, Gage Div., Dayton, Ohio.
Spindles—Grinding
Ex-Cell-O Corp., 1210 Oakman Blvd.
Detroit, Mich.

Spinnings

American Aluminum Ware Co., 372 Jelliff Ave., Newark, N. J.

Splice Bars
Carnegle-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

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Spray Bachine Co., Philadelphia, Pa.
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Devilbias Co., The, Toledo, Ohio,
Mahon, R. C., Co., Detroit, Mich.
Sprayers—Paint
DeVilbias Co., The, Toledo, Ohio.
Spring Making Machinery
Baird Meh. Co., The, Bridgeport, Conn.
Torrington (Conn.) Mfg. Co., The.

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Torrington (Conn.) Mfg. Co., The.

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Lake St., Chicago, Ill.
American Spring & Mfg. Corp., Holly,
Mich.
American Steel & Wire Co. (U. S.
Steel Corp. Subsidiary), Cleveland.
Barnes-Gibson-Raymond, Detroit Plant,
Div. of Associated Spring Corp.
Barnes, Wallace Co. Div. of Associated
Spring Corp., Bristol, Conn.
Cook Plant of Barnes-Gibson-Raymond,
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Arbor, Mich.
Cuyerboga Spring Co., The, Cleveland.
Dunbar Bros. Co., Div. of Associated
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Hubbard, M. D., Spring Co., 330 Central Ave., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale,
Pa.
Lee Spring Co., Inc., 30 Main St.,
Brooklyn, N. Y.
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American Brake Shoe & Foundry
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Ill.

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Worcester (Mass.) Stamped Metal Co., 6 Hunt St.

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Continental Steel Corp., Kokomo, Ind.
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The.

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olleys
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East
283rd St. Wickliffe. Ohio.
Curtis Pneumatic Mchry. Div. of Curtis
Mfg. Co., 1948 Kienlen Ave., St.
Louis, Mo.
Ford Chain Block Div. American Chain
& Cable Co., Inc., Philadelphia, Pa.

Trucks-Dump, Industrial
Atlas Car & Mfg. Co., The, Cleveland, Ohio.

Trucks—Hand

Mercury Mrg. Co., 4144 S. Halsted St.,
Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.

Atlas Car & Mfg. Co., The, Cleve-land, Ohio.
Automatic Transportation Co., 75 W.
87th St., Chicago, Ill.
Baker-Raulang Co., The, 2175 W. 25th
St., Cleveland, Ohio.
Elwell-Parker Electric Co., The, Cleve-land, Ohio.
Mercury Mfg. Co., 4144 S. Halsted St.,
Chicago, Ill.

Trucks & Tractors—Electric Indus-trial

friol
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Automatic Transportation Co., 75 W.
87th St., Chicago, Ill.
Baker-Raulang Co., The, 2175 W. 25th
St., Cleveland, Ohio.
Elweil-Parker Electric Co., The, Cleveland, Ohio. land, Ohio.

Mercury Mfg. Co., 4144 S. Halsted St.,
Chicago, Ill.

Trucks & Tructors—Gasoline & Diesel Silent Hoist Winch & Crane Co., 851-63rd St., Brooklyn, N. Y.

Wis.

Baker-Raulang Co., The, 2175 W. 25th
St., Cleveland, Ohio.

Mercury Mfg. Co., 4144 S. Halsted St.,
Chicago, Ill.

Tube Mill Machinery

Aetna-Standard Engineering Co., The,
Youngstown, Ohio.
Continental Roll & Steel Foundry Co.,
East Chicago, Ind.
Taylor-Wilson Mfg. Co., 25 Thomson
St., McKees Rocks, Pa.
United Engineering & Fdry. Co., Ptgk.
Waterbury (Conn.) Farrel Foundry &
Machine Co., The.

Tube Mill Machinery—Welded
Continental Roll & Steel Foundry Co.,
East Chicago, Ind.
McKay Machine Co., The, Youngstown,

Tubes-Boiler
Jones & Laughlin Steel Corp., Pitts-Tumbling Sarrers
burgh,
National Tube Co. (U. S. Steel Corp.
Substidiary), Pittsburgh,
Steel & Tubes Div. of Republic Steel
Corp., Cleveland.
Tubular Service Corp., 120-44th St.,
Brooklyn, N. Y.

Brooklyn, N. Y.

Tumbling Sarrers
Burnishing & Tumbling
Strends Tumbling
Steel Carbolog Co., Inc., 11153 East 8-Mile
Road, Detroit.
Firth-Sterling Steel Co., McKeesport.
Pa.

es—Brass, Copper, Bronze, Nickel Silver merican Brass Co., The, Waterbury, Conn. Conn.
Bridgeport (Conn.) Brass Co.
Lewin-Mathes Co., St. Louis, Mo.
Phosphor Bronze Smelting Co., The,
Pilla., Pa.
Pic & Tube Products, Inc., Jersey
City, N. J.
Revere Cupper & Brass, Inc., 230 Park
Ave., New York City.

Tubes—Heat Exchanger
Steel & Tubes Div. of Republic Steel
Corp., Cleveland, Ohio.

Tubes—High Carbon
Steel & Tubes Div. of Republic Steel
Corp., Cleveland.

Tubes—Stainless Steel
Allegheny Ludium Steel Corp., Pittsburgh, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand
St., New York City.
National Tube Co. (U. S. Steel Corp.
Subsidiary), Pittsburgh.
Byerson, Jos., T., & Son, Inc., Chicago. cago. Steel & Tubes Div. of Republic Steel Corp., Cleveland. Tubular Service Corp., 120-44th St., Brooklyn, N. Y.

Tubing-Aluminum Seamless
Aluminum Co. of America, Pittsburgh

Tubing—Copper Coated or Tinned Steel Bundy Tubing Co., Detroit, Mich.

Tubing—Magnesium Alloys
American Magnesium Corp., 1791 Gulf
Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson
Ave., Midland, Mich.

Fubing—Monel
Bundy Tubing Co., Detroit, Mich.
International Nickel Co., Inc., 67 Wall
St., New York City.

Tubing—Open Seam
Steel & Tubes Div. of Republic Steel
Corp., Cleveland.

Corp., Cleveland.

Tubing—Sexmless Steel
Allegheny Ludium Steel Corp., Pittsburgh. Pa.
Frasse, Peter A., & Co., Inc., 17 Grand
St., New York City.
Jones & Laughlin Steel Corp., Pitts
burgh.
National Tube Co. (U. S. Steel Corp.
Subsidiary). Pittsburgh.
Ohio Seamless Tube Co., The, Shelby,
Ohio Ohio.

Pipe & Tube Products, Trac., Jersey City, N. J.

Ryerson, Jos. T., & Son, Inc., Chicago. Timken Roller Bearing Co., The, Can-Timken Roller Bearing Co., The, Canton, O.

Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

Tubular Service Corp., 120—44th St.,

Brooklyn, N. Y.

Youngstown (Ohio) Sheet & Tube Co.,

The.

Tubing—Square and Rectangular
National Tube Co. (U. S. Steel Corp.
Subsidiary), Pittsburgh.
Standard Tube Co., The, Detroit, Mich.
Steel & Tubes Div. of Republic Steel
Corp., Cleveland.
Tubular Service Corp., 120—44th St.,
Brooklyn, N. Y.

Trucks & Tractors—Gasoline Industrial
Allis-Chalmers Mfg. Co., Milwaukee,
Wis.
Baker-Raulang Co., The, 2175 W. 25th
St. Cleralund Obto. Jones & Laughlin Steel Corp. Pitts-burgh.
National Tube Co. (U. S. Steel Corp. Subsidiary). Pittsburgh.
Ohio Seamless Tube Co., The, Shelby.
Ohio.
Standard Tube Co., The, Detroit, Mich.
Steel & Tubes Div. of Republic Steel
Corp., Cleveland.
Tubular Service Corp., 120-44th St.,
Brooklyn, N. Y.
Youngstown (Ohio) Sheet & Tube Co.,
The.

Young The

Tubular Products

Bundy Tubing Co., Detroit, Mich.
National Tube Co. (U. S. Steel Corp.
Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel
Corp., Cleveland.
Swan Engleering Co., Inc., Newark.
N. J.
Tubular, Service Corp., 120—44th St. N. J. Tubular Service Corp., 120—44th St., Brooklyn, N. Y.

Tungsten Metal & Alloys
Electro Metallurgical Sales Corp., 30
E. 42nd St., N. Y. C.
Mallory P. R., & Co., Inc., Tedianapolis, Ind.

Turbine-Generators—Steam
Allis-Chalmers Mfg. Co., Milwaukee,
Wis.

Wis.
Westinghouse Electric & Mfg. Co., East
Pittsburgh, Pa.

furbo-Compressors
Spencer Turbine Co., The, Hartford, Conn.

Turntables

American Bridge Co. (U. S. Steel Corp. Subsidiary). Pittsburgh.
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Hill Acme Co., The, Canton Div., 6490
Breakwater Arc., Cleveland, Ohio.
Whiting Corp., 15991 Lathrop Ave.,
Harvey, Ill.

Twist Drills
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New
Bedford, Mass.

Valves-Air Blast for Presses Logansport (Ind.) Machine, Inc.

Valves—Air & Hydraulic Control
Brown Instrument Co., The, Philadel-Brown Instrument Co., The, Philadel-phia, Pa. Crane Co., Chicago, III. Hannifin Mfg. Co., Chicago, III. Homestead Valve Mfg. Co., Coraopolis,

Pa.

Logansport (Ind.) Machine, Inc.

Nicholson, W. H., & Co., 165 Oregon
St., Wilkes-Barre, Pa.

Tomkins-Johnson Co., The, Jackson,

Mich.

Valves-Butterfly
R-S Products Corp., Philadelphia, Pa.

Valves—Carbon
National Carbon Co., Inc., Carbon Sales
Div., Cleveland, Ohio.

Div., Cleveland, Ohio.

Valves—Hydraulic
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Bayard, M. L., & Co., Inc., Philadelphia, Pa.
Birdsboro (Pa.) Steel Foundry & Machine Co.

Birdsboro (Fa.) Steel Founds
chine Co.
Crane Co., Chicago,
Denison Engineering Co., The, 1160
Dublin Rd., Columbus, Ohlo.
Farquhar, A. B., Co., Lid., York, Pa.
Homestead Valve Mfg. Co., Coraopolis,

Homesteau Yaive ans.
Pa.
Racine (Wis.) Tool & Machine Co.
Watson-Stillman Co., The, 103 Aldene
Road, Roselle, N. J.
Wood, R. D., & Co., Philadelphia, Pa.

Volves—Iron, Steel & Bross Acme Valve & Fittings Corp., Chicago, Ill.

III.
Crane Co., Chicago.
Homestead Valve Mfg. Co., Coraopolis,
Pa.
Jarecki Mfg. Co., Erie, Pa.
North American Mfg. Co., The, Cleveland, Ohio, Wood, R. D., & Co., Philadelphia, Pa.

Valves—Lead National Lead Co, 111 Bway., N. Y. C. Valves-Molded Plastic Haveg Corp., Newark, Delaware.

Vanadium

Electro Metallurgical Sales Corp., 30

E. 42nd St., N. Y. C.

Vanadium Corp. of America, 420 Lexington Ave., New York City.

Cincinnati (Ohio) Milling Mch. Co., The.

Jarecki Mfg. Co., Erie, Pa.

North Bros. Mfg. Co., Philadelphia, Pa.

Vises—Machine
Hendey Machine Co., Torrington, Conn.
Ross, David J., Co., Benton Harbor,
Mich.
Sheldon Machine Co., Inc., Chicago,
Ill.
Strickland E. M.

rickland, E. M., 5135 Whitfield Ave., Detroit, Mich. Detroit, Mich.

Washers—Iron or Steel

Beall Tool Co., Div. Hubbard & Co.,
East Alton, Ill.

Nicetown Plate Washer Co., Inc., Philadelphia.

Oliver Iron & Steel Corp., 10th &
Muriel Sts., Pittsburgh, Pa.
Seasions, J., H., & Son, Hooker Court,
Bristol, Conn.

Shakeproof, Inc., 2525 N. Keeler Ave.,
Chicago.

Washers—Leather
Chicago (III.) Rawhide Mfg. Co., The,
1306 Elston Ave.
Garlock Packing Co., The, Palmyra,
New York.

New York.

Washers—Lock
Beall Tool Co. Div. Hubbard & Co.,
East Alton, Ill.
Harper, H. M., Co., The, 2607 Fletcher
St., Chicago, Ill.
Shakeproof, Inc., 2525 N. Keeler Ave.,
Chicago.
Thompson-Bremer & Co., 1640 N. Hubbard St., Chicago.

Washers—Spring
Beall Tool Co. Div. Hubbard & Co.,
East Alton, Ill.
Harper, H. M., Co., The, 2607 Fletcher
St., Chicago, Ill.
Hubbard, M. D., Spring Co., 330 Central Ave., Pontiac, Mich.
Shakeproof, Inc., 2525 N. Keeler Ave.,
Chicago.

Trai Ave., Shakeproof, Inc., 2525 N. Review Chicago.

Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

Washing Machines—Industrial
Alvey-Ferguson Co., The, 711 Disney St., Cincinnati, Ohio.

Mahon, R. C., Co., Detroit, Mich.
Ranschoff, N., Inc., Cincinnati, Ohio.

Ransohoff, N., Inc., Cincinnati, Ohio.

Welded Machine Bases
Bayard, M. L., & Co., Inc., Philadelphia, Pa.

Rirk & Blum Mfg. Co., The, Cincinnati, Ohio.

Mahon, R. C., Co., Detroit, Mich.

Newark (N. J.) Oxwelding Co., Inc.

Van Dorn Iron Works Co., The, Cleveland, Ohio.

Welder Control—For Spot, Butt & Projection Welding Machines Electric Controller & Mig. Co., The, Cleveland.

Welding
Heintz Mfg. Co., Philadelphia, Pa.
New Yerk Engineering Co., 75 West
St., New York City.
Pfaudler Co., The, Rochester, New
York.
Superior Sleeprite Corp., Chicago, Ill.
Van Dorn Iron Works Co., The, Clevaland, Ohio.

Welding-Contract
Farrel-Birmingham Co., Inc., Ansonia, Conn.
General American Transportation Corperation, Plate & Welding Div., Sharon, Pa.

Welding and Cutting Machines and
Equipment—Oxy-Acetylene
Air Reduction, 60 East 42nd St.,
N. Y. C.
Linde Air Products Company, The, 30
East 42nd St., N. Y. C.
National Cylinder Gas Co., Chicago, III.
Weldit Acetylene Co., Detroit, Mich.

Welding Fixtures
Hamischfeger Corp., 4401 W. National
Ave., Milwaukee.

Welding Machines—Electric Arc
Air Reduction, 60 East 42nd St., New
York City.
Allis-Chalmers Mfg. Co., Milwaukee, General Electric Co., Schenectady, N. Y.
Harnischeger Corp., 4401 W. National
Are., Milwaukee, Wis.
Hobart Bros., Co., Troy, Ohio.
Lincoln Electric Co., The, Cleveland,
National Cylinder Gas Co., Chicago, III.
Westinghouse Elec. & Mfg. Co., East
Ptgh.

Welding Machines—Resistance Sciaky Bros., Chicago, Ill. Swift Electric Welder Co., Detroit, Mich.

Welding Positioner
Cullen-Friestedt Co., 1303 S. Kilbourn
Ave., Chicago, III.
Ransome Concrete Machinery Co., Dunellen. N. J.
United Engineering & Foundry Co.,
Pittsburgh.

Welding Rods or Wire

Air Reduction, 60 East 42nd St.,

N. Y. C.

Alloy Rods Co., York, Pa.

American Brass Co., The, Waterbury,

Con. American Brass Co., The, Waterbury,
Conn.
American Steel & Wire Co. (U. &,
Steel Corp. Subsidiary), Cleveland.
Arcos Corp., Philadelphia, Pa.
Bethlehem (Pa.) Steel Co.
Bridgeport (Conn.) Brass Co.
Harnischfeger Corp., 4401 W. National
Are., Milwaukee.
Jones & Laughlin Steel Corp., Pitts-burgh.
Lincoln Electric Co., The, Cleveland.
Linde Air Products Company, The, 30
East 42nd St., N. Y. C.
Maurath, Inc., 7400 Union Are., Cleveland.
National Cylinder Gas Co., Chicago, Ill.

land. fational Cylinder Gas Co., Chicago, Ill. Page Steel & Wire Div. American Chain & Cable Co., Inc., Monessen, Chain & Cable Co., Ane., 230
Park Ave., New York City.
Seneca Wire & Mig. Co., The, Fostoria, Ohio.
Titan Metal Mig. Co., Bellefonte, Pa., Wall-Colmonoy Corp., Detroit, Mich.
Wickwire Brothers, Inc., Cortland, N. Y.

Wickwire Brothers, Inc., Cortland, N. Y. Wickwire Spencer Steel Co., 500 Fifth Are., N. Y. C. Youngstown (Ohio) Sheet & Tube Co., The.

Del. Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.

American Manganese Steel Div. of The American Brake Shoe & Foundry Co., Chicago Heights, III.

Wheels—Diamond Smit. J. K., & Sons. Inc., 157 Cham-bers St., New York Otty.

Wheels—Seam Welding
Mallory, P. R., & Co., Inc., Indianapo

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GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN

YERSON CERTIFIED STEELS





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HAMILTON, ONTARIO NEW BRITAIN, CONN BRIDGEPORT, CONN.



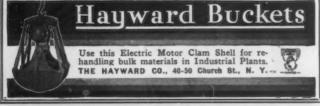
Fig. 1434



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PRODUCTS INDEX

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Silent Hoist Winch & Crane Co., 851-63rd St., Brooklyn, N. Y.

Wire—Aluminum
Aluminum Co. of America, Pittsburgh.

Wire—Barb
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Cleveland, Ohio.
Wickwire Brothers, Inc., Cortland,
N. Y.

Wire—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze American Brass Co., The, Waterbury,

American Brass Co., The, Wateroury, Conn.
Bridgeport (Conn.) Brass Co.
Phosphor Bronze Smelting Co., The,
Philadelphia, Pa.
Revere Copper & Brass, Inc., 230 Park
Ave., New York City,
Roebling's, John A., Sona Co., Trenton, New Jersey,
Seymour (Conn.) Mfg. Co., The,

Wire-Bronze Plated

Wire Co., Inc., Johnson Steel & Worcester, Mass.

-Electro Galvanizing Equipment Meaker Co., The, Chicago, Ill.

Meaker Co., The, Chicago, III.

fire—Flat, Round, Square or Special Shapes

American Steel & Wire Co. (U. S. Steel Corp., Subsidiary), Cleveland.

Continental Steel Corp., Kokomo, Ind.

Johnson Steel & Wire Co., Inc.,

Worcester, Mass. Wire Co., Inc.,

Fage Steel & Wire Div. American

Chain & Cable Co., Inc., Monessea,

Pa.

Rathbone, A. B. & J., Palmer, Mass.

Roebling's, John A., Sons Co., Trenton, N. J.

Seneca Wire & Mfg. Co., The, Fostoria,

Ohio,

Wickwire Brothers, Inc., Cortland,

N. Y.

wire Spencer Steel Co., 500 Fifth

Wire-High Carbon

ire—High Carbon
American Steel & Wire Co. (U. S.
Steel Corp., Subsidiary), Cleveland.,
Johnson Steel & Wire Co., Inc.,
Worcester, Mass,
Jones & Laughlin Steel Corp., Pittsburgh Steel & Wire Div., American
Chain & Cable Co., Inc., Monessen,

Chain & Caule Co., Inc., Januares, Pa.
Republic Steel Corp., Cleveland, Ohio, Roebling's, John A., Sons Co., Trenton, New Jersey.

Wire—insulated

American Steel & Wire Co. (U. S. Steel
Corp. Subsidiary), Cleveland,
General Electric Co., Schenectady,
N. Y. N. Y. oebling's, John A., Sons Co., Trenton, N. J. R

Fig 232

Wire—Music
Johnson Steel & Wire Co., Inc.,
Worcester, Mass.
Webb Wire Works, New Brunswick, Webb Wire Works, New Brunswick, N. J. Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

Ave., N. Y. C.

Wire—Spring
American Steel & Wire Co. (U. S. Steel
Corp. Subsidiary), Cleveland.
Barnes, Wallace Co., Div. of Associated
Spring Corp., Bristol, Conn.
Columbia Steel Co. (U. S. Steel Corp.
Subsidiary), San Francisco, Calif.
Johnson Steel & Wire Co., Inc.,
Worcester, Mass.
Jones & Laughlin Steel Corp., Pitts-burgh.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohlo.

-Stainless Steel legheny Ludium Steel Corp., Pitts-

ire—Stdiniess
Allegheny Ludlum Steel Corp., Phtts-burgh, Pa.
Page Steel & Wire Div. American Chain & Cable Co., Inc., Monessen, Pa.
Webb Wire Works, New Brunswick,

Wire—Zinc
Platt Bros. & Co., The, Waterbury.
Conn.

Wire Cloth
Buffalo (N. Y.) Wire Wks. Co., Inc.
Ludlew-Sayler Wire Co., The, St.
Leuis, Mo.
Boehling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland,
N. Y. Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

Wire Drawing, Straightening & Cut-ting Machinery Ajax Mfg. Co., The, Cleveland.

Wire Forming Machinery
Ajax Mfg. Co., The, Cleveland.
Baird Mch. Co., The, Bridgeport, Nilson, A. H., Mach. Co., Bridgeport. Torrington (Conn.) Mfg. Co., The.

Wire Forms, Shapes and Specialties Accurate Spring Mfg. Co., 3819 W. Lake St., Chicage, Ill. American Spring & Mfg. Corp., Holly, Mish.

American Spring & Mfg. Corp., Holly, Mieh.

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.

Barnes-Gibson-Raymend, Detroit Plant Div. of Associated Spring Corp.

Barnes, Wallace, Oo., Div. of Associated Spring Corp., Bristol, Conn.

Crown Products Co., 3401 Newton Ave., Indianapolis, Ind.

Cuyahoga Spring Co., The. Cleveland.

Dusbar Bros. Co. Div. of Associated Soring Corp., Bristol, Conn.

Eastern Tool & Mfg. Co., Bloomfield, N. J.

Fischer, Chas., Spring Co., The, 240 Kent Ave., Brooklyn, N. Y.

Hindley Mfg. Co., Valley Falls, R. I.

Hubbard, M. D., Spring Co., 330 Central Ave., Prontiac, Mich.

Jones & Laughlin Steel Corp., Pitts
burgh.

tral Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Pittsburgh.
Judd. H. L., Co., Inc., 97 Chambers
St., New York City.
Lee Spring Co., Inc., 30 Main St.,
Brooklyn, N. Y.
Luxlew-Saylor Wire Co., The, St. Louis,
Ms.

Me. Cassul vire Co., The, St. Louis,
Raymond Mfg. Co. Div. of Associated
Spring Corp., Corry, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Spencer Steel Co., 500 Fifth
Ave., N. Y. C.

fire Mill Machinery and Equipment
Lewis Machine Co., The, 3455 E. 76th
St., Cleveland, Ohlo.
MeKay Machine Co., The, Youngstown,
Ohlo.
Morgan
Genstruction Co., Worcester,
Mass.
Shusker, F. R., Co., The, New Haven,
Conn.

Snusser, F. R., Co., The, New Haven, Conn.
Vaughn Machinery Co., The, Cuyahoga Falls, Ohio.
Waterbury (Ct.) Farrel Fdry. & Mach. Co., The.

Wire Rope
American Steel & Wire Co. (U. S. Steel
Corp. Suboidiary), Ofeveland.
Bethlehem (Pa.) Steel Compony
Columbia Steel Co. (E. S. Steel Corp.
Subsidiary), San Francisco, Dulf.
Jones & Laughtin Steel Corp., Pittsburgh.
Lesches, A., & Sons Repo Co., burgais.
Lesches, A., & Sons Repo Co.,
St. Louis, Mo.,
Macwayte Co., Kenosha, Wisc.
Roebling's, John A., Sens Co., Trenton, N. J.
Wickwire Spencer Steel Co., 500 Fifth
Ave., N. Y. C.

Wire Rope Fittings
Macwhyte Ca., Kenosha, Wisc.
Robbling's, John A., Sons Co., Trenton, N. J.

Wire Straightening and Cutting Ma-chinery—Automatic Lewis Machine Co., The, 34% E. 78th St., Cleveland, Ohlo, Shuster, F. B., Go., The, New Haven, Ot.

Wire Work

Buffalo (New York) Wire Works Co.,
Inc.
Ludlow-Saylor Wire Co., The, St.
Louis, Mo.
Wickwire Brothers, Inc., Cortland, New
York.

Wrenches Armstrong Bros. Teol Co., Chicago. Beall Tool Co. Div. Hubbard & Co., East Alton, Ill. Williams, J. H., & Co., Buffale, N. Y.

Wrenches—Pipe Greenfield (Mass.) Tap & Die Corp.

Wrenches-Top North Bros. Mfg. Co., Philadelphia, Pa.

Zinc—For Die Castings New Jersey Zinc Co., The, 160 Front St., New York City.

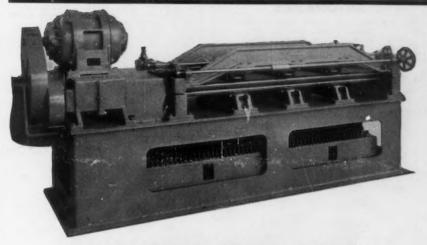
New Jersey Zinc Co., The, 160 Front St., New York Otty.
Platt Bros. & Oo., The, Waterbury.
Conn.

Zirconium Metal & Alloys
Electro Metallurgical Sales Corp., 30
E. 42nd St., N. Y. C.

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IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS PARTIAL LIST - NUMEROUS OTHER MACHINES ALSO AVAILABLE



75" TORRINGTON ROLLER LEVELLER, MOTOR DRIVEN

Including 15 H.P. General Electric A.C. Motor and Starter
Capacity 72" Wide Sheets up to .060 Gauge
Nineteen Rolls 2" Diameter Feed Rolls 3%" Diameter x 75" Face
All rolls hardened and ground chromium plated
Including Torrington Mechanical Lubricator for Automatic
Lubrication of Bearings

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126" Pyramid Type, Belted M.D. Capacity 7/16" Plate

Model 32-P Logemann Scrap Metal Baler. 60"x20"x14". Complete with pump and motor

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Niles Cylinder Boring Mill. 1-6" and 1-10" Main Boring Bar, 1-2%" and 1-3%" Bar for the side heads

RUILDINGS

60'x172' Structural Steel Building with Runway 150'x250' Steel Building. Complete with 25 ton P&H and 10 ton P&H Overhead Electric Travel-ing Cranes, both 50' span and equipped with three 220 volt DC motors

No. 7 Ajax, M.D. Face of Crosshead 12"x76". 16" Stroke No. 8 Ajax, M.D. Face of Crosshead 14"x741/2". Stroke 20"

71/2 ton CLEVELAND OVERHEAD ELECTRIC TRAVELING CRANE

34' 4" Span Three 230 Volt DC Motors couble Fish Belly Box Girders

CRANES-OVERHEAD ELECTRIC TRAVELING

SUVILED - OLFULEWS	FFF	INIC	INMIEL	11142
2½ ton Euclid	17'814"	Span	220/3/60	A.C
3 ton Shepard	35'4"		110 Volt	
5 ton Whiting	30'		220 Volt	
5 ton Shepard	35'4"		110 Volt	
5 ton Shepard	40'		110 Volt	
5 ton P & H	50'		220 Volt	
10 ton Alliance	32'314"		220/3/60	
10 ton PRMCO			440/3/60	
20 ton Maris	38'6"		220 Volt	
25 ton Shaw			220 Volt	
30 ton P & H			220 Volt	
30 ton Sellers	80'		220 Volt	
			220/3/60	
	5 ton At			24.6

CRANES-HAND OPERATED

	ton		36'	Span
8	ton	Whiting	28'	Span
10	ton		33'	Span
30	ton	Whiting	56'	Span

CRANE BRIDGES

10 ton P & H 26' Span 15 ton Alliance 42'6" Span All complete with End Trucks

DERRICKS

ton American Derrick. 115' Mast. 100' Boom. Complete with steam hoists, guy-wires, and repes ton Savage Derrick. 115' Mast. 100' Boom. Complete with steam hoists, guy-wires, and r.pes

CRANE-CHARGING

CUTTING OFF MACHINES

8" Standard Engr. Co. Cutting Off Mac'ine, M.D. 10" Standard Engr. Co. Cutting Off Machine, M.D.

FLANGING MACHINE

e Flanging Machine

FORGING MACHINES

Ajax, National, Steel Frame

FURNACES

2500 x Electric Furnace Company Annealing Furnace 8' wide x 24' high x 24' long. Complete with loader and controller 300 x Rockwell Rivet Annealing Gas Fired Furnace. Furnace Body 3'9' wide x 6'9' long 40-60 lb. Moore Size "W" Electric Melting Fur-

nace 750 lb. Detroit Type "AA" Melting Furnace 7 ton Heroult Electric Melting Furnace

1500 Ib. CHAMBERSBURG STEAM FORGING HAMMER

HAMMER-STEAM DROP

··v·· Slides Alliance

HAMMERS-STEAM FORGING

600 lb. Bement Miles Single Frame 650 lb. Chambersburg Double Frame 1000 lb. Chambersburg Double Frame 1200 lb. Chambersburg Double Frame 2000 lb. Erie Double Frame

No. 3 Manville %"x41/2" ODDS Cold Header. Belt Driven

HOT METAL MIXER

ton. Complete with rocker bed, cylinders, union, bearings, etc. Riveted throughout

Arranged for Motor Drive. Maximum capacity 12" dia. hole thru 24" dia. shaft — 40' long. Diameter hole thru spindle 26". Spindle bearing 29" dia.

' McKay Roller Leveller 17 Rolls, 41/4" dia.,

LEVELLER-STRETCHER

60"x144" Hyde Park Stretcher Leveller Hydrauli-cally Operated. Complete with Pump and Motor

ton Euclid Standard Type. H-2 Trolley Hoist with enclosed cab. 220/3/60 A.C. Motor. Com-plete with 530 ft. of track and "A" frames for

roll Mannesmann. Arr. M.D. Two drive ralls 10½ dia. Capacity tube dia. 2 9/16" to 3". Maximum Billet-42" long. Maximum Shell or Tube 18' long

-HYDRAULIC

RESSES—HYDRAULIC

No. 4 West Tire Setter Co., 12 Cylinder Hydraulic Shell Banding Press. Suitable for banding 6" and 8" shells

1000 ton Southwark Four Column Press 31"x31"

Between Columns, 68" Stroke. Complete with Pump and Motor

1000 ton Watson-Stillman Hyd: aulic Hobbing or Die Press. Platens 24"x24". Dia. Ram 20". Dia. Space 8". Complete with Pump and Mo'or 3000 ton Southwark Forginz Press. 3 Columns. 17" dia. 7" Between Columns, 15" Stroke, 30"

Daylight

Vertical Hydraulic Fisnging Press. Bed 9'11" with T slots, 9'11" Platen. 4 4½ rods, 24" ram 300 ton Chambersburg Hydromatic Hydraulic Forging Press, 4 Column. Stroke 18". Bed Area 49x72"

-HYDRAULIC WHEEL

400 ton Niles Double End, motor driven. Distance between bars 48" 500 ton Chambersburg Hydro-Pneumatic, arr. for M.D. 24" stroke. 54" bet. tie bars

M.D. 24" stroke. 54" bet. tie bars

PRESSES—MISCELLANEOUS

*6 Blisa Horizontal Reducing Press, B.D. Stroke

*8". Width of Bed 26"

*60½ Bliss Reducing Press. Belt Driven. Stroke

4" to 42", 16¼" Bet. Gibs

*D45 Ferracute Press, Horizontal Double End,

Screw Type, 38" Ram Stroke

*856 Toledo Rack & Pinien Press, B.D. Stroke

5" to 36"

PUNCH & SHEAR COMBINATIONS

VNCH & SHEAR COMBINATIONS

No. 2 Hilles & Jones Double End Punch & Shear,
M.D. 25" throat. Cap. to punch 1" thru 1",
shear 6"x1"

No. 3 Long & Allstatter Single End Punch. Belted
Motor Drive. 24" Throat. Capacity pun h 3",
thru 3", Equipped to shear 4"x3" flat steel
in lengths. 13" long and punch small notches
in each side
Style F Niles-Benent-Pond Single End Punch,
Arranged for motor drive, 18" Throat. Capacity
3" thru 2"

Arranged for motor drive, 18 Introd. Capacity 3" thru 2" Jones Single End Pench, Belt Drive. 54" Throat. Capacity to pench 1" thru 1" Rock River Single End Pench, 48" Throat. Capacity 14" thru 1". Arr. M.D. UNCH.—HORIZONTAL.

Jones. Arr. M.D. Capacity

PUNCH-MULTIPLE

E Long & Allstatter Double Cran't Multiple Punch. T&L Pullev Drive. 114" Between Housings. Capacity 659.5 tons Pressure

ROLLING MILLS

10"x16" United E & F Co. Single Stand Two High 16"x19" Waterbury Farrel Four Stand 2 High 36"x116" Hovg Single Stand 2 High 30"—3 High Sheet Bar Mill

SHEAR—ALLIGATOR

42" Doelger & Kirster

Belt Driven. Capac Kirsten No. 3½ Alligator Shear. Capacity 4½" round 4¼" rquare SHEAR-ANGLE

4x4x1/2" Long & Allstatter Double Angle Shear. Arr. M.D. SHEAR-BAR

2 Hilles & Jones Guillotine Bar Shear, motor riven. Capacity 21/2" round, 2" square SLITTER

Braddock Slitter. Arr. M.D. Capacity 1/4"

STACK—BLOOMING MILL
3'x80' Blooming Mill Stack. Made up in 10 ft.
sections with 41/2" brick lining STRAIGHTENERS

TRAIGHTENERS

1/16", ½", ½", ½" Shuster Straightening & cut-off Machines. Belt or Motor Drive

1" Kane & Reach Bend Straightening Machine TESTING MACHINE

200,000 lb. Tinius Olsen Hydraulic Compression Concrete Testing Machine UNLOADING TOWER

112' Link-Belt Structural Steel Tower. Complete with bucket and eight motors

WELDING MACHINES

800 KVA "Swift" Flash Welder with two transformers
Taylor Winfield Flash Welder. Capacity 4 to
8%" Pipe
350 KVA Federal Flash Welder, 440 volt, 3 phase,
60 cycle Motors

RITTERBUSH & (OMPANY, INC Manufacturing

NEW YORK CITY

Confidential Certified Appraisals Liquidations-Bona Fide Auction Sales Arranged

Consulting Engineering Service Surplus Mfg. Equipment Inventories Purchased

THE IRON AGE, June 25, 1942-175

- THE CLEARING HOUSE



REBUILT AND READY to SHIP

- -20" SELLERS slotters, M.D. with 3/60/220 V motor
- 1-22" BEMENT-MILES slotter, M.D. with 3/60-/220 V motor
- I-4" BIGNALL KEELER pipe machine, M.D. with 3/60/440 V motor
- I-24" INGERSOLL cutter grinder, M.D. with 3/60/440 V motor
- -No. I MANVILLE cold header, single pulley
- -No. I CAMPBELL nibbling machine, M.D. with 3/60/220 V motor

PUNCHES & SHEARS

20" Throat No. 00 H & J Single End

42" Throat No. 2 H & J Single End

42" Throat No. 4 H & J Single End

54" Throat No. 5 H & J Single End

60" Throat A-250 L & A Single End

48" Throat No. 8 SOUTHWARK

36" Throat No. 3 SOUTHWARK Double End

24" Throat No. 4 L & A Double End No. 3 H & J Open Throat Bar Shear

R.T.-40 SCHULTZE-NAUMANN Beam Shear, 15 HP, motor

NIAGARA Circle Shear 1/8" Cap.

No. 1 L & A Multiple Punch, 6" throat. 18' 12 ga. Hydraulic Press Brake



SIMMONS MACHINE TOOL CORP.

1721 North Broadway, Albany, N. Y. N. Y. Office: 149 Broadway

IN STOCK

AUTOMATICS

No. 515 National Acme, four spindle No. 52 National Acme, four spindle No. 53 National Acme, four spindle 134" Gridley, four spindle 134" Gridley, four spindle No. 454 New Britain four spindle 8" pneumatic chucks

BROACHES

No. XB10 Oilgear Hydraulic Twin Spindle 15 Ton Hercules Vertical

4' Prentice Radial No. 17 Foote Burt, 2 spindle No. 1 Bausch, 8 spindle Pratt & Whitney Gun Barrel, 2 spindle, m.d.

GEAR CUTTERS

No. 6 Fellows Gear Shaper 96" Gleason Gear Planer 15" Gleason Spiral Bevel Generator 13" Gleason Gear Tester No. 5A Lees-Bradner Gear Generator No. 10 Lees-Bradner Gear Grinder 30" Rochester Gear Tooth Rounder

GRINDERS

10x20 Landis Cylindrical Hydraulic 12"x42" Landis Cylindrical 14"x72" Norton Cylindrical 16"x50" Norton Crankshaft No. 55 Heald Cylinder No. 60 Heald Cylinder No. 2 Diamond Surface No. 24—53" Gardner Disc

LATHES

17"x 8' Sidney, c.d.
18"x 6' Lodge & Shipley, c.d.
18"x 9' Chard, c.d.
17"x 8' Wickes Production, c.d.
3½"x80' Fitchburg Lo-Swing, g.h.
No. 9 LeBlond Multicut, g.h.

TURRET LATHES

No. 2B Foster, g.h.
No. 6A Potter & Johnston, g.h.
No. 2A Warner & Swasey, g.h.
2/4x24 Jones & Lamson, g.h.
3x36 Jones & Lamson, g.h.

MILLS, PLAIN

No. 3 Cincinnati, c.d.
No. 2 Kent Owens, m.d.
No. 2 Kent Owens, p.f., m.d.
No. 8 S Becker Duplex, c.d.
No. 4 Hendey Lincoln Type, c.d.

MISCELLANEOUS

No. 227 Dreis & Krump Leaf Brake (12' %"x18" Nilson Wire Straightener Wicaco Oil Groover 2" Pratt & Whitney Duplex Spline Mill

PLANERS

22"x22"x 6' Gray 30"x30"x 8' Cincinnati 30"x30"x 8' Ohio 36"x36"x12' Woodward & Powell

No. 14V Rickert Shafer No. 1 Garvin 1/2" Rickert Shafer Radial

INDIANAPOLIS MACHINERY & SUPPLY CO., INC.

1959-69 South Meridian Street Indianapolis, Indiana

44 WHITEHALL STREET, NEW YORK, N. Y.

EASTERN OFFERS

MULTIPLE SPINDLE DRILLS

Spindle 24" Barnes All Geared Self-Oiling
6 spindle National Acme Semi-Automatic Horizontal
No. 008 Garvin Horizontal Duplex
No. 1 Pratt & Whitney 2 spindle Gun Barrel
D2 Fox Straight Line, 7 spindles
No. 2 Baush Hydraulic, 38x21" head
No. 2 Baush, 16x30" head
No. 3 Baush, 16x30" head
No. 3 Baush, 16x30" head
No. 7D Moline 2 spindle Hole Hog
D11 Fox, 20x14" head
No. 15HC Fox Hydraulic
No. 26C Fox Tapper
No. 37 Natco, 22x30" head
No. 51C Harrington, 22" square head

BALL BEARING DRILLS

2 spindle Henry & Wright
3 spindle Special Avey
3 spindle Barr
4 spindle Allen
4 spindle Allen
4 spindle Gardam
4 spindle Henry & Wright
4 spindle Henry & Wright
6 spindle Henry & Wright
6 spindle Henry & Wright
7 spindle Henry & Wright
8 spindle Henry & Wright 4 spindle Gardam 4 spindle Henry & Wright Class K 4 spindle Henry & Wright Class B 4 spindle Kokomo 6 spindle Henry & Wright 7 spindle Barr

RADIAL DRILLS

2½' Avey Sensitive 3' American Sensitive 3' Carlton Sensitive 4' Hammond Jack Knife 5' Fosdick Plain 5½' Niles Semi-Universal 6' Niles Universal, gear box

ENGINE LATHES

ENGINE LATHES

18" raised to 28"x10' Reed
18"x12' Barker
18"x16' Reed
20"x8' Fay Scott
20"x10' Davis
20"x10' Pond
21"x12' Brasdford
22"x13' Niles
22"x16' centers Ameri an 190 H.P. Input Super
Lathe, geared head, with 100 H.P. D.C. Variable
Speed Motor, weight 65,000 lbs.
22"x18' Niles
24"x8'6" Bridgeford
24"x10' Bridgeford
24"x10' Whitcomb-Blaisd-11
24"x10' Chard
24"x16' Schumacher-Boye
26"x16' Settia-Bridgeford. taper 24"x16' Schumacher-Boye 26"x16' Betts-Bridgeford, taper 30"x14' Hamilton

MANUFACTURING LATHES

3x80" Lo Swing
8x36" Lo Swing
11"x4' F. E. Wells
15"x6' Automatle Threading Lathes (3)
16"x6' Rockford Semi-Quick Mfg.
13"x8' Chard Production
20"x8' American Turret
30" Streit Pulley Turning Lathe
Niles-Bement-Pond Axle Lathe, cone
42x96" Niles-Bement-Pond Car Wheel Lathe, m.d., new Niles-Bement-Pond Quartering Machine, m.d., new

SHAPERS

16" Hendey Friction Type 20" Ohio Back Geared, gear box 24", 28" Ohio, Drive All gear box 32" Morton Railroad Type Draw Cut, m.d. 32" Gould & Eberhardt, m.d.

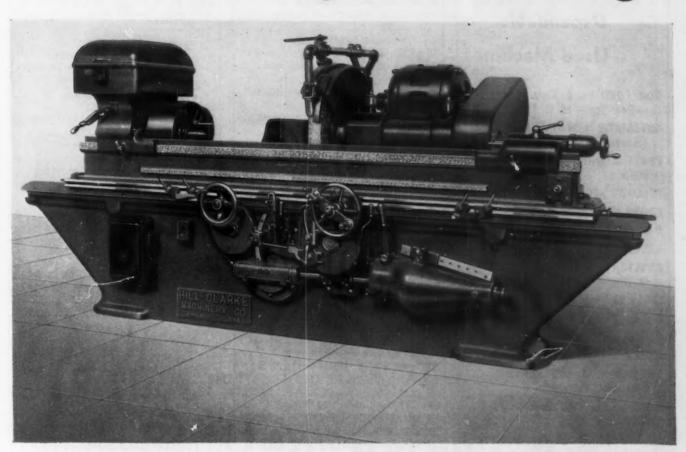
TURRET LATHES AND SCREW MACHINES

No. 0 Brown & Sharpe Hand, cone 2½x24" Jones & Lamson, bar feed 3x36" Jones & Lamson, chucking 3x36" Jones & Lamson, chucking 2 spindle 3x36" Jones & Lamson, chucking 18" Libby Type A, no cross slide Woods Tilted Turret, cone

Many other machines in Stock. Send us your inquiries.

MACHINERY CO. 1002 TENNESSEE AVE., CINCINNATI, OHIO

Yours for Super Grinding!



HILL-CLARKE CYLINDRICAL GRINDERS

give you a finish within a few micro-inches even when using standard grain free-cutting wheels. Contributing to this achievement is a patented multiple V-belt drive from a constant speed motor to the work spindle.

Throughout the machines there are refinements in design, fitting of components, minimized vibration which make possible extreme accuracy in all grinding operations. An accurately fitted wheel slide with cross feed screw mounted in ball bearings provides sensitive wheel control essential to duplicate work within close limits. Write for literature on Hill-Clarke Grinders available in the following sizes:

Also
HILL-CLARKE
PRODUCTION
UNIVERSAL
GRINDERS

in these sizes: 12x36 · 12x50 · 12x72



HILL-CLARKE MACHINERY CO.

OFFICE: 647 WASHINGTON BOULEVARD CHICAGO

- THE CLEARING HOUSE -

MOREY

Dependable Used Machines

ROCKFORD No. 2 Horiz, Boring Mill -Floor Type-M D.

AUTOMATIC MACHINE CO. 12" x 4' Threading Lathe

PRATT & WHITNEY 6" x 132" Thread

FELLOWS #4T Thread Generator FOOTE BURT #3 Rail Drill

P & W #12 Multi-Spindle Drill

NATCO C-13 Hyd. Multiple Spindle Drill COULTER 2 Spindle Diamond Borer-

INGLE 12" Gear Tooth Rounders

G & E 48" Gear Cutter

GLEASON 24" Bevel Gear Planer

GLEASON 37" Bevel Gear Planer

GLEASON 10" Spiral Bevel Gear Generator

GLEASON 6"-11"-18" Bevel Gear Generators

LEES-BRADNER #5A Gear Generator LANDIS 31/2" Internal Hydraulic Race

LANDIS 16" x 36" Plain Cyl. Grinder-M. D.

HEALD No. 60 Internal Grinder LANDIS 4" Single Head Bolt Cutter

COCHRANE & BLY No. 5 Cold Saw

ESPEN LUCAS No. 138 Cold Saw-Cap. 12" Round

NEWTON No. 200 Cold Saw-Cap. 11"

N. B. P. 400 ton Hyd. Wheel Press GRAY 30" x 30" x 8' Planer-2 heads on cross rail-M. D.

ACME 1" All Steel Upsetter AJAX 3" All Steel Upsetter

THIS IS A PARTIAL LIST-

Write us your specific inquiries

MACHINERY CO., Inc.

MISCELLANEOUS

9/16" Cridley Model G automatic. I" Cleveland Model J double end threading, pointing, turning or drilling.
No. 16 Gisholt Simplimatics.

1400 cu. ft. 20"x12"x14" Sullivan WJ3 compressor.

AC die casting machine.

221/2" Barnes 4 spindle heavy duty drill. Nos. 0 & 00 Garvin horizontal drills.

No. 1 Baush 16 spindle drill.

No. 13 Pratt & Whitney 16 spindle drill. 3' Cincinnati radial drill.

16" Fosdick 6 spindle sensitive drill. 151/2 & 151/2F Foote Burt mfg. drills.

3-Way Foote Burt drill with heavy multiple heads.

No. 1D American carburizing furnace. No. 36 BN Gould & Eberhardt multiple spindle gear cutter.

National Cleveland Model B gear checker. Lipe double spindle gear chamferer.

17"x36"-48" Norton double head hyd. crank pin grinder.

18" Gardner semi-automatic disc grinder. No. 41 Ransom 71/2 H.P. motor drive double end grinder.

Pratt & Whitney worm or thread grinder. Nos. 50 & 60 Heald cylinder grinders. Hutto vertical single spindle Model M.D. honing machine.

500 lb. Bradley helve hammers.

21/2"x18" No. 4 Mitts & Merrill keyeater.

14"x8' Lodge & Shipley lathe.

No. 3 Wood tilted turret lathe. 13"x6' Automatic threading lathe.

16"x10' LeBlond Rapid Production lathe. 18"x7'6" Wickes Rapid Production lathe.

20"x8'6" Wickes Rapid Production lathe. 4 & 6 cylinder Melling turning lathes. 36" Niles car wheel boring machine.

Hall planetary thread miller.

No. 3C Lees Bradner thread miller. Nos. 1 & 11/2 Knight vertical millers.

No. AB Becker vertical miller.

60" Ingersoll rotary continuous miller. 25"x25"x14' Ingersoll slab miller.

Nos. 10 & 45 Bilton Producto - Matic

Nos. 1 & 1A Davis & Thompson double end continuous millers.

No. 3 Sundstrand rotary "Rigidmil." No. 1B Campbell nibbler.

Young Bros. two compartment oven. 14"x1" Cleveland 12" throat horizontal

punch. 11/4"x1" Long & Allstatter 12" throat single end punch and shear.

54" McKay sheet level roller.

No. 1A Ajax taper forging roll.

12" Dill Slotter.

11/2" Acme upsetter.

2" National upsetter.

21/2" & 4" Ajax upsetters.

We may be able to move your surplus tools. Tell us about them. "Keep 'em Flying'

MILES MACHINERY CO. Saginaw, Mich.

UPSETTERS

National 1" High Duty, guided overarm slides National 5", guided overarm heading slides Alax 2½"-3", suspended slides Older style box type slides 1".5"

HAMMERS

HAMMERS
Bradley 40#-60#-80#-200# Helve
Bradley 150#-300# Upright
Steam Forging 250#-400#-600#-1100#-1500#-2000#
Single Frame
Steam Forging 1000#-4000#-6000# Double Frame
Yeakley Air Hammer 80#
Beaudry 300#

BOLT & RIVET MACHINERY

Bolt, nut and rivet machinery for both hot and cold manufacture Complete wood screw equipment

BULLDOZERS

Williams-White Nos. 1-2-3-4-27

PRESSES

Open Back Inclinable Nos. 1-2-3-4-5 Solid Back Nos. 2-3-4-5 No. 68 Toledo double action cam drawing

MISCELLANEOUS

MISCELLANEOUS

New Apron Brakes 10' 10 ga—10' ½"

Shuster Wire Straighteners 3'6-½-3'6-¾"

Williams-White Forging Roll, large, brake lever type

Elwell-Parker three wheel trucktractor

Cranes—2—2 ton traveling, D.C., 36' span

48" Oesterlein Tilted Offset Miller

LaPointe Hydraulic Broach 48"—1000 =
Yoder Cold Slitter

Yoder Strip steel forming rolls

Ber Shears—Buffale 1½-2½'z" cap.

D. & K. No. 4 Alligator Shear—cap. 5" round

54 single and double end punches and shears

Hydraulic presses—880 ton, 1500 ton

DONAHUE STEEL PRODUCTS CO.

74TH & ASHLAND AVE., CHICAGO, ILL.

Lathes

9"x14" Porter Cable (2) No. 324 Adriance Spinning Lathe 20"x10' LeBlond, Universal Crankshaft

Milling Machines

No. 2 Plain Kearny & Trecker Vertical, M.D. No. 2 Knight Vertical (2) 2" Pratt & Whitney spline (duplex)

Radial Drills

3' Carleton 3' Morris M.D. 3½' American M.D.

Turret Lathes

2½"x26" Jones & Lamson Steel Hd. M.D. 3½"x36" Jones & Lamson, M.D. 4D Potter & Johnston M.D. (2) Goss & De Leeuw Chucking, 6"x6½" 2 Spindle J&L Steel Head

Gear Machinery

No. 61 Fellows Gear Shaper, M.D. No. 4-48" Brown & Sharpe Gear Cutter Lees Bradner Gear Grinders (2) "Pratt & Whitney Gear Grinder

Miscellaneous

Miscellaneous
Na. 303 Bliss straight side (2)
Na. 23 Steel Horning Press
Na. 3 Adriance, Inc., Press
Na. 25 Adriance, Inc., Press
Na. 26 Adriance
Na. 26 Adriance
Na. 4 Garvin Profiler
Na. 1 Foote-Burt Duplex Surface Broach
Na. 4 Garvin Profiler
Na. 1 Foote-Burt Duplex Surface Broach
Na. 4 Hilles & Jones Double End Punch and Shear
2" Acme Bolt Threader
Na. B-16 Natco Multiple Spindle Drill
Na. 1 Baker Keyseater
Na. 20 Heald Rotary Surface Grinder

WIGGLESWORTH MACHINERY COMPANY 195 Bent St., Cambridge, Mass.

MACHINE TOOLS

1-No. 14 BROWN & SHARPE GRINDER, M.D. 1-18" CINCINNATI PLAIN MILL, M.D. 1-No. 33 BROWN & SHARPE PLAIN MILL,

2—9" PORTER-CABLE MFG. LATHES, M.D. 1—UNIVERSAL GEAR TESTER

-UNIVERSAL GEAR TESTER -No. 62 BLISS PUNCH PRESS, M.D. -No. 1 BAUSH MULTIPLE DRILL, M.D. -No. 6A POTTER & JOHNSTON TURRET LATHES, M.D. -KINGSBURY 8 HEAD MULTIPLE DRILL,

CENTRAL MACHINE TOOL

122-126 Nebraska Ave.

WAREHOUSE STOCK IMMEDIATE DELIVERY

BORING MILLS

48" Gisholt Vertical, 2 heads, mtr. dr. Q.C. 48" Bickford Vertical, belt drive, 2 heads, power feed. 39" Swing Niles Vertical, 2 heads, belt drive. DRILLS

#2 Colburn 4-spindle #4 M.T. mtr. dr. 2-spindle Allen BB Sens. 4-spindle Allen BB Sens. 2-spindle Fosdick BB Sens.

GRINDERS

20"x144" Landis Plain Cylin. 4-motor drive, gap bed.
6"x30" Landis Plain or motor drive.
#72-A-3 Heald Sizematic, 3 motors.
16"x96" Norton Surface motor drive.
#1 Gardner Hydraulic face, motor drive.
#6 Bryant chucking, motoredrive.
#3 Bryant chucking, motor drive.

LATHES

LATHES

26"-50"x18" McCabe 2-spindle, belt drive.

25"x14" LeBlond, 3-step cone DBG, quick change.

(2) 21"x10" LeBlond 3-step DBG quick change mtzd.

(2) 21"x8" LeBlond 3-step cone DBG quick change mtzd.

20"x10" American 3-step cone DBG quick change mtzd.

18"x8" Lodge & Shipley belt drive, quick change.

18"x8" Sebastian gap, belt drive, quick change.

14"x10" Lodge & Shipley, belt drive, quick change.

20" Steptoe single geared, belt drive. 18" American back geared, belt drive. 16" Smith & Mills, back geared, belt drive. 16" Chard single geared, mtzd.

TURRET LATHES

28" Bogart belt drive 4'
(3) 21" Gisholts, mtzd.

(5) 24" Gisholts 61/4" hole in spindle, mtzd.
(2) 2"x24" Jones & Lamson, geared head.
(6) 3"x36" Jones & Lamson, geared head.
(4) 21/4"x26" Greenlee Turrets, bar equipment, mtzd.
21/4"x24" Acme, mtzd.
(2) 31/4"x36" Acme, geared head.
(3) 21"x36" LeBlond turret on carriage QC.
7"x60" Fitchburg LoSwing.

MILLERS

#2204 Kearney & Trecker 2 face cutters, mtr. dr. rap. trav.
#58 Becker Plain, table 16"x47", belt drive.
#8 Becker Vertical 24" dia. rotary table.
#6 Becker Vertical table 18"x49", QC.
6"x14" Pratt & Whitney Thread, mtzd.
(5) Hand Milling Machines, mtzd.

MISCELLANEOUS

16" Hewes & Phillips Slotter, belt drive 30" table.
18" Newton Slotter, belt drive.
36" Newton Cold Saw, hydraulic feeds.
#6 Cochrane Bly 24" Cold Saw.
4"x8' Cadillac Centering machine.
4" Williams Rapiduction Pipe Machine, mtr. dr.
150# Kane & Roach Power Hammer, mtr. dr.

PUNCHES & SHEARS

24" Bement, belt drive, arch jaw, cap. %x%. 30" throat Gray Rotary Shear, SP drive cap. 3/16. 1/2" cap. Ryerson Rotary Bevel Shear, belt drive.

PLANERS

36"x36"x11" Fitchburg, belted mtr. dr. one head. 24"x24"x6" Pond, belt drive, one head. 24"x24"x6" Wheeler, belt drive, one head. PRESSES

New ±5 Federal openback Inclinable, mtr. dr. 4" stroke cap. 50 tons. #2 Zeh & Hahneman Inclinable flywheel type 8 ton cap.

O'BRIEN MACHINERY CO. THE

OFFICE: 113 NORTH THIRD STREET, PHILADELPHIA, PA.

REBUILT MACHINE TOOLS AVAILABLE FOR SHIPMENT

MILLING MACHINES

#25 BECKER, back geared

#8 PRATT & WHITNEY Automatics, 5"x16"

#12 BROWN & SHARPE Production, table 6x30

LATHES
18"x22"x10' FAY & SCOTT, gap bed, mtr. dr.
20"x10 RAHN LARMON, geared head, quick change
20"x10 LODGE & SHIPLEY, motorized, quick 20 x10 LUGGE & change change 26 x10 PBRIDGEFORD, quick change taper attach. 36 x16 BRADFORD, taper attach. 48 x20 FITCHBURG 50 x22 NEW HAVEN

TURRET LATHES
2" ACME, bar and power feeds
STEINLE, 4½" spindle capacity, power feeds
21" GISHOLT, 3½" capacity, 2 power feeds
2½" 224" JONES & LAMSON, s.p.d., geared head
3"x36" JONES & LAMSON, s.p.d., geared head

SHAPERS & PLANERS

SHAPERS & PLANERS

16" OHIO SHAPER, motorized

26" AMERICAN TOOL, motorized

24"x24"x 6" REW HAVEN Planer, I head

30"x30"x 8" WOODWARD & POWELL Planer, one

swivel rall head, one side head

36"x36"x10" GRAY, 2 swivel heads

42"x42"x12" BETTS Planer, 2 swivel heads

#2 YAZ XIZ BETTS Planer, Z swivel neads
GRINDERS
#1 LeBLOND, tool & cutter universal
6x32" NORTON, direct motor drive
6x42" WILMARTH & MORMAN, universal
10x20" LANDIS Cylindrical self-cont. motor drive
16x50" NORTON, direct motor drive
#2 BROWN & SHARPE Surface Grinder

New 6x18" Surface Grinders, motor in base

GEAR CUTTERS & SHAPERS 3x36" BROWN & SHARPE 24" FELLOW SHAPER

RADIAL DRILLS RADIAL DRILLS
30" MUELLER, gear box
4' CINCINNATI BICKFORD, s.p.dr.
5' AMERICAN TOOL, motorized
5' DAVIS, motorized

PRESSES & BROACHING MACHINES
#24 TOLEDO, 5" stroke
#3 LaPOINTE Broaching
#16 PELS UNIV. Punch & Shear, %" cap.

GRAHAM MACHINE TOOL, INC. 231 CENTRE ST. NEW YORK CITY WORTH 4-8125-6

USED MACHINE TOOLS **GUARANTEED BY**

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1 spdl. Leland-Gifford
2 spdl. Leland-Gifford Bench
4 spdl. Sigourney
4 spdl. Woodward & Rogers
6 spdl. Henry & Wright
No. 1 Baush Multiple
4' Western Plain Radial

GEAR CUTTERS

No. 4-48" Brown & Sharpe

Hill-Clarke Production Universal 12x50

(See page 177 Hill-Clarke Cylindrical Grinders)
No. 40 Bryant Plain, Wide Wheel, Oscillating
No. 18 Bryant Internal
No. 10 Lees - Bradner Spur Gear Grinder
No. 5 Springfield Planer Type Surface
1½" dia. New Yankee Drill Grinder
No. 60 Heald Cylinder

LATHES

3½"x60" Fitchburg Lo-Swing No. 4 AC LeBlond Auto. Duplex Crankshaft 20"x16' American 26"x10' Bridgeford 30"x12' Whitcomb-Blaisdell

PLANERS

36"x36"x8' Cincinnati

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18" Libby, 31/2" H.S.

MISCELLANEOUS

10" Newton Crank Slotter 10" N. wton Crank Slotter
No. 3 Baker 2 spdl. Cyl. Borer
60" Quickwork Rotary Shear
No. 3-B J. N. LaPointe Broach
No. 4 J. N. LaPointe Broach
6" Saunders Pipe Machine
No. 12 Bignall & Keeler Pipe Machine
No. 4 Gaterman Tapper

HILL-CLARKE MACHINERY CO.

647 W. WASHINGTON BLVD.

CHICAGO



No. 112 KOBERT **ELECTRIC FORGING PRESS**

100 ton pressure.
Crankpin diameter 5".
Stroke 4", adjustment 5½".
Ram 7½" x 4½".
Center of ram to frame 12".
The back shaft is mounted on roller

The back snart is house. The bearings.
Arranged for motor drive with 5 HP.
3-60-220/440-1160 G.E. motor.
The machine is now equipped with dies for hot embossing of flat discs about 3"

in diameter.

The discs are placed in a rotary conveyor The dises are placed in a rotary conveyor which automatically indexes to the induction heating unit. After the work is heated to the proper temperature, the conveyor automatically indexes the dises into position and the operator trips the press and the dies come down and strike the work. The pieces are then automatically ejected from the dies and drop out. The height of the present die, feed and heating unit is 32".

The feed is equipped with a Reeves drive for varying the speed.

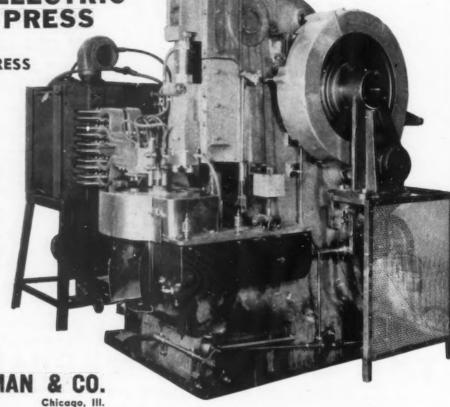
The heating unit has the following characteristics: 150 KVA—60 cycle, 440 Volts.

Can be arranged for many high produc-tion forging operations.

Available for inspection at our Chicago warehouse



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Automatics, CLEVELAND, 7/8" 4 spdle. Model M. Automatics, CLEVELAND, 11/4 & 2" Model B. M.D. Automatics, GRIDLEY, 21/4, 31/4 & 41/4" S.S. Automatics, GRIDLEY, 7/8" Model G. Automatics, NEW BRITAIN, #22, 23 & 24. Drills, #17 D MOLINE Hole Hog, 6 spdle. Drills, #17 D MOLINE Hole Hog, 6 spdle. Grinders, B. B. B. 1 to 8 spdles. Gear Hobbers, #3 & 12 BARBER-COLMAN. Grinders, B. & S. #16 Plain, 12x72". Grinders, BATH & THOMPSON UNIVERSAL. Lappers, 26" BETHEL-PLAYER. Lathes, LO-SWING, 4"x84" S.P.D. Planers, BEDFORD & PATCH, 36"x13" Open Side with 1 Rail & 1 Side Head, M.D. Presses, MINSTER #6 O.B.I., M.D. Presses, TOLEDO, #34, Solid Back, Geared. Presses, TOLEDO, #14 & 141/2 Horning, 1.D. Presses, FERRACUTE Solid Back, #92, 3 & 4.

Presses, FERRACUTE Solid Back, #P2, 3 & 4. OTT MACHINERY SALES, INC.

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Grane-3 Ton 32' P&H 220V DC Shear—Quickwork #6, 1" cap. Shear—Nibbler 36"x"/4" Savage—MD Shear-Bevel, 34" & 1" Lennox-MD Hammer-10,000# Chamb. Guided Ram Hammer—10,000# Chamb. Guidea Ram Hammers—3000 - 1500# Chamb. Steam Roll—10'x½" Bertsch, Pinch Type Roll—6'x½" Bertsch, Pyr. Type—Belted Roll—6'x½" Bertsch, Pyr. Type Punch—24" Cleve C 1" thru ¾"—MD Punch—27" Cleve EF, 1¼" thru 1"—MD Punch—36" Cleve EF, 1¼" thru 1"—MD Punch-42" Massillon, #5, Arch, Jaw, MD Punch-DE Cleve EF, 36" & 14" Punch-60" Cleve EF, 11/4" thru 1"-MD Brake—10' x 10 ga. Ohl—MD Flanger—½'' McCabe Grinder—#60 Heald Internal Lathe—24"x16" Bradford, TA, Chk. Turret Lathe—16''x3' P&W Riveter—12' Southwark Hyd.

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48" x 48" x 14' GRAY Planer, 4 heads. 24" GLEASON Straight Bevel Gear Planer. 10'-6" OHL Power Press Brake, #10 ga. cap.

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150 ton FAIRBANKS-MORSE Railroad
Track Scale, 46' long

Track Scale, 46' long

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FAIRBANKS-MORSE 30,000# 8'x12' Platform Scale with electric weighograph

-Winch, drum 31'' x 37'' arranged for
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50"x30" NEW HAVEN, M.D.
24"x26" FAY & SCOTT, 5 step
26"x13" BOYE & EMMES
30"x16" LODGE & SHIPLEY, 5 step
24"x14" RAHN-LARMON
48"x26" NILES grd. face plate dr.

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SELLERS 36" x 36" x 9' Planer—4 Heads
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DRAPER 26" x 18' Lathe
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1000 ton Hydraulic Press built by R. D. Wood Company, up-moving type, 6 posts, platen 42" x 108", stroke 18", daylight space 36", complete with pump, accumulator, motor, compensator and high pressure piping and fittings. A-1 condition.

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GRINDER, Univ. No. 5 B & S. 20"x72", B.D.
GRINDER, Cyl. 18"x30"x96" Norton, M.D.
PRESS, #59 Toledo straight 5ide, stroke 8".
PUNCH, 3A Royersford, 1"-34", throat 10".
PUNCH, "C" Cleveland, 1"-5%", throat 24".
PUNCH, "EF" Cleveland, 1\(\(^4\)\)"-1", throat 27".

PUNCH, "EF" Cleveland, 11/4"-1", throat 60", Solenoid Attachment.
PUNCH, Horiz., D.E., L&A, 11/4"-1", throat

PUNCH, Mult., 10' L&A "E", 340 tons, bed

PUNCH, Mult., 10' L&A 'E', 340 tons, sec 10'8''. SHAPER, Draw-cut, 48'' Morton, M.D. SHEAR, Plate, 50''x'¾'' W & W, throat 25''. SHEARS, Squaring, 40'', 48'', 54''x'¼''. SLOTTER, Port. 60'' Morton, M.D. SLOTTERS, DIII 15'' & Betts 8'' M.D.

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BULLDOZER (Rivet Machine) air driven 12" diam. air cylinder 111/2" from length of live lever 14" from dead lever to rivet.

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Motor Driven. With Standard Equipment and large Assortment of Cutting Tools.

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28"x16' Pond, Cone
42"/64"x16' Harrington Gap
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21"x12' Ryerson Conradson, T.A.
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1 HP Portable Electric Disc Sanders BAUSCH #1 Multiple Drill 12 Spindles TOLEDO #92 B Dbl. Crank SS Geared Press RICKERT SHAFER CO. 1/4" Vertical Tapper #2 CHAS. LEFFLER & CO. dbl. seamer

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Two model 36 six cylinder 10x12½ two cycle, each 240
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200 KW Electric Machinery, factory built, compound interpole, 35° rating, 900 RPM, 300 H.P., 3 phase, 60 cycle, 4000 volt, 40° synchronous motor.

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(2)-	3	Sprague	20'6"	115-VDC.
	(unde	erslung type	4'6" & 2'0"	overhang)
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(1)-	71/2	Toledo	31'0"	110-VDC.
(1)-	10	P&H	40'0"	220-VAC.
	10	Shaw	41'0"	A.C. or D.C.
(1)-		Box		Hand Operated
(1)—		Case	31'0"	IIO-VDC.
(1)-		Case	50'0"	220-VDC.
(1)-	25/5	Morgan	50'0"	230-VDC.

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BUCKETS

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Complete with electrode motors, control panel, all mechanical & electrical parts, bus bars, cable leads, etc.
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2	American Lo-Hed	2	16'6"		
1	P & H	5	50'	220 VDC	
1	Whiting	5	51'7"	220/3/60	
1 1 1 1	Runway	5	100'x21'	High for abo	
1	Lane 5 of	10	50'	2-220/3/60	
1	Northern	20	48'	3-220 VDC	Cab
1	Sellers	30	66'	No Motors	Cab
1	Morgan	35	57'	3-600 VDC	Cab
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THE IRON AGE, June 25, 1942-183

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WANTED

1 back geared press approximately 14"
stroke 150 to 200 tons capacity. Also several
single back geared presses 80 to 100 tons
2½" or greater stroke. Also seam welder
for 16 ga. metal for longitudinal and circum-

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ANY MAKE
TYPE
SIZE
PRESSURE Must be free from defects. H. P. BREARLEY

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STEEL BUILDINGS
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ADDRESS BOX W-919 Care The Iron Age, 100 E. 42nd St., New York

TUBING ENGINEER is sought by manufac-

HELP WANTED

MANUFACTURING ENGINEER WANTED

Do you want war work now PLUS an opportunity for a permanent position after the war? tunity for a permanent position after the war? At the present time we need a top-notch engineer or a machine shop and tool man for war-production work with "know-how" experience in fabrication of steel products. Particularly desired is "all-around" background of manufacturing knowledge in rolling, hot-pressing, forging, and forming rings from plate, bar and tubing, with special emphasis on getting new jobs into production. AFTER THE WAR, we then expect to revert aggressively to our substantial. with special emphasis on getting new jobs into production. AFTER THE WAR, we then expect to revert aggressively to our substantial backlog of peace-time product-development work, which was being expanded rapidly before the war, and will STILL NEED men who have proved their creative ability, resourcefulness, and capacity to take responsibility and get things done. This is an unusual opportunity. If you can produce practical results, we can offer every possibility for greater responsibility and advancement. Excellent salary to the right man—now and as future progress merits it. Age: open. Must be U. S. citizen. Our company leader in its field and in business many years, in a stable, expanding industry. Location: city of 25,000 population in Western Pennsylvania. In reply, include age, schooling, nast business connections, and tell us what you have done. Write in strict confidence to: Address Box V-170, care The Iron Age, 100 E. 42nd St., New York.

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ORNAMENTAL IRON FABRICATOR
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Talk to Customers, no selling or prieing. Good
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onalifications, etc. Kerrigan Ornamental Iron Works, Nashville, Tenn.

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SITUATIONS WANTED

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MECHANICAL ENGINEER Graduate, Age 36, Thirteen years' broad experience in every phase of steel mill operation and plant engineering. Now employed. Desires key and permanent position as Works Manager, Plant Engineer, or Power Plant Engineer. Eastern location preferred. Complete details on request. Address Box V-162, care The Iron Age, 100 E. 42nd St., New York.

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PURCHASING AGENT—Desires change. Executive experience in manufacturing for nine years. Can qualify as assistant works manager. Good steel following. Address Box V-143, care The Iron Age, 100 E. 42nd St., New York.

TUBING ENGINEER is sought by manufacturer of electric resistance welded steel tubing. Only those with a broad background will be considered. Age 35 to 50. Salary commensurate with ability to produce. In reply, state age, education, experience, places worked and salary desired. All replies strictly confidential. Our organization has been advised of this advertisement. Address Box V-168, care The Iron Age, 100 E. 42nd St., New York.

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